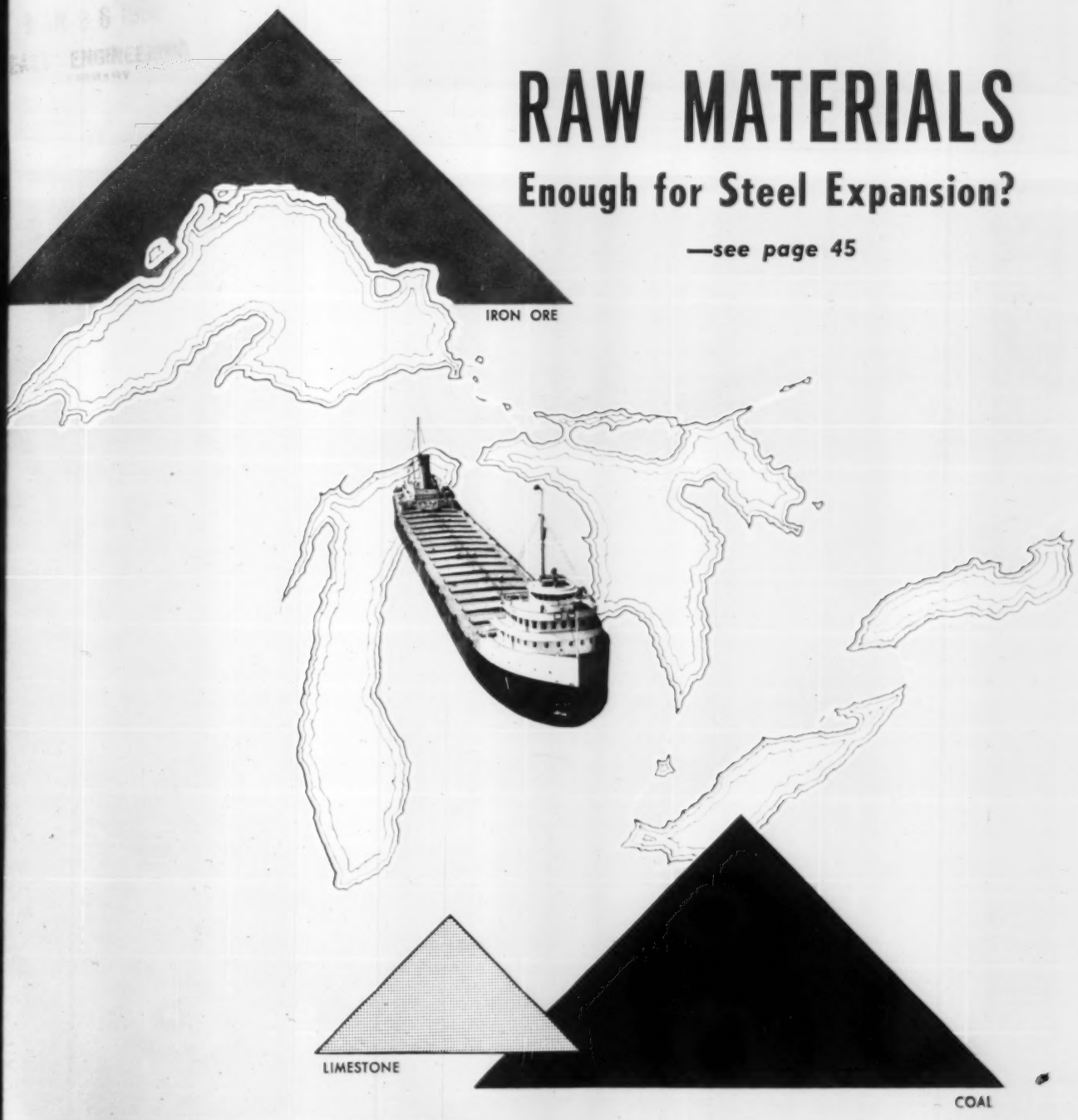
MARCH 26, 1951

STEEL

The Weekly Magazine of Metalworking



RAW MATERIALS

Enough for Steel Expansion?

—see page 45

Small Parts Bore-Hardened on Screw Machines, p. 74

Controlled Materials Plan: How Much Coverage? p. 57

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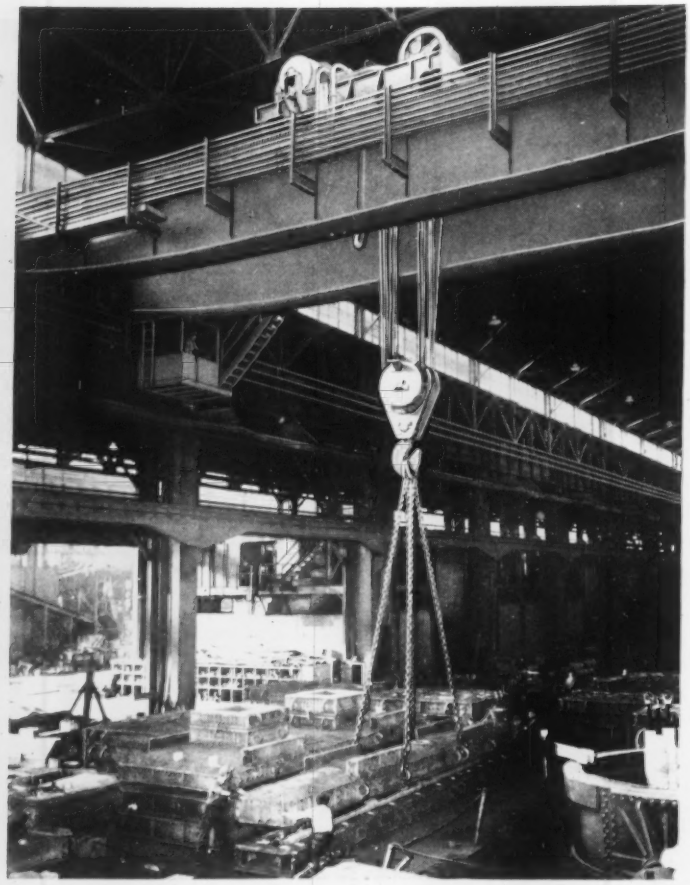
HEAVY LOADS SPOTTED QUICKLY, SAFELY



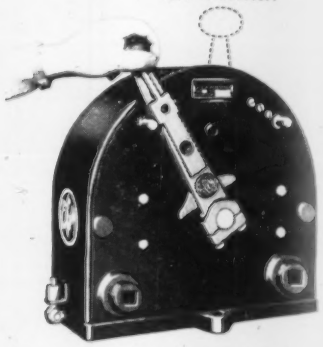
Here's Where EC&M CONTROL Gives Unexcelled Results

The EC&M Wright Dynamic Lowering Circuit Controller for crane-hoists is well known for its ability to permit accurate, short movements when spotting a load. The operator has complete control of all lowering speed-points. In setting the cope with this 125-ton crane, quick response through fast brake release enables the operator to close the mold carefully—with a minimum number of movements which maintenance men recognize as a contributing factor to reduced up-keep. The Wright Circuit is safe—specify EC&M Crane Control.

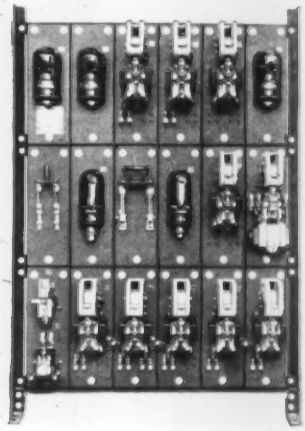
WRITE FOR BULLETIN 921

Photo—Courtesy, Cleveland Crane & Engineering

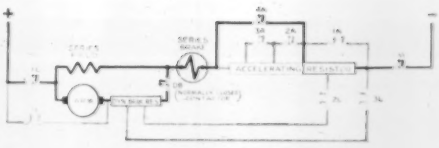
OFF-POSITION



Speed-control Master Switches have short throw—narrow width—and are convenient for the operator to use.



The Wright Dynamic Lowering Circuit Controller (with protection) for crane-hoists.



First point lowering connections put all the current from the line through the brake for fast release.

THE ELECTRIC CONTROLLER & MFG. CO.
2698 EAST 79TH STREET • CLEVELAND 4, OHIO

STEEL
The Weekly Magazine of Metalworking

VOL. 128 NO. 13 MARCH 26, 1951

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Editorial and business Staff—Page 10. Advertising Index—Page 168. Editorial index available semiannually. STEEL also is indexed by Engineering Index Inc., 29 West 39th St., New York 18.

Next Week **. . What Platers Can Do About the Nickel Shortage . . . Critical Metal Usage Slashed in Revised TV Circuits . . . Multiple Machining for Interchangeability . . . Aircraft Propeller Blades Hot Extruded Faster**

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Carbide tools lapped with ELGIN DYMO Diamond Compound produce 2 to 10 times as many pieces between grinds. More grinds per tool are certain, too, because less material is removed in the sharpening operation.

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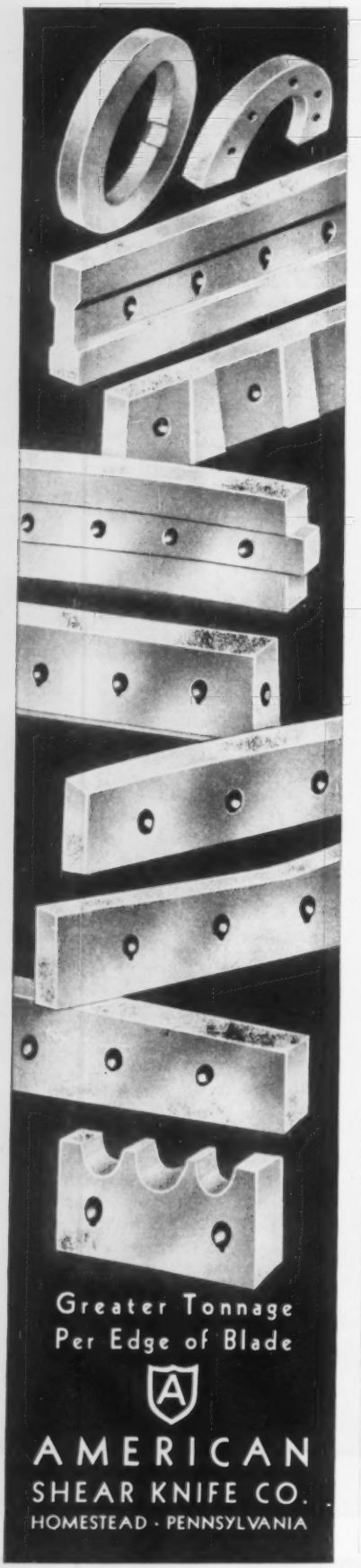


Behind the Scenes . .

Sign of Spring

The raw material story to which this week's cover refers is an omen of spring. The article stems from an annual survey STEEL runs in connection with the spring opening of the iron ore season. Every year, the editors mark the event with estimates of present ore stocks and how much ore will be brought down the Great Lakes. This year, the boys upstairs decided to study coal and limestone, as well as iron ore, and also to study the whole ore situation, not just conditions in the Mesabi area alone.

Managing Editor Walt Campbell and Associate Editors John Morgan and Dan Reebel gathered the material. John wrote the final story.

What's in a Name?

Several queries have come in on the significance of our name which appears at the bottom of this page. "Do you pronounce it or sneeze it?" asks one loyal reader.

You pronounce it, sir, as though it were spelled Shurdlew. The name arises because of a mistake like this: mistake loke this: shrdlu shrdlu shrd

The typesetters (man, are they having fun with this item), when they find they have erred in a line, merely run down the outside column on their keyboards to fill out the line. That column spells out Shrdlu.

Free Ride

Gary Hewitt, a far-traveling circulation representative for STEEL, reports a novel situation in Jacksonville, Fla. The local bus company invites anyone to ride free to any Jacksonville church on any Sunday morning between 8:00 a.m. and 1:00 p.m.

All the church-goer has to do is tell the driver he wishes to go to church. For free return transportation, he needs only tell the driver he has been to church.

Quite an idea!

Snow Eater

Canadian Pacific Railway reports that it is using a new piece of snow removal equipment that is almost human. It not only eats snow, but like a man with too many radishes, the machine can also regurgitate it when the occasion arises.

A combination snow blower and melter, it was ordered by CPR last fall from William Bros Boiler & Mfg. Co., Minneapolis.

From the enthusiastic reports of the railroad, we gather it works better than the pint-size snow blower we used during the big storm just after last Thanksgiving when we attempted to clean out our gravel driveway. The blower blew the snow away all right, but about 50 per cent of the gravel was whooshed onto our nice front lawn, too.

Winners

The winner! R. B. English of Perfection Mattress & Spring Co. is the first man to score 100 per cent on our news quiz of March 5. He gets our honorary degree plus a prize stolen from a famous senator. First one in with answers was F. G. Hefti, Crucible Steel Co. He scored 90 and is eligible for our handsome degree which will be sent both to him and to Mr. English forthwith.

You're still eligible for the degree if you mail in answers to our Mar. 5 quiz and answer at least 90 per cent correctly. The contest closes Apr. 15.

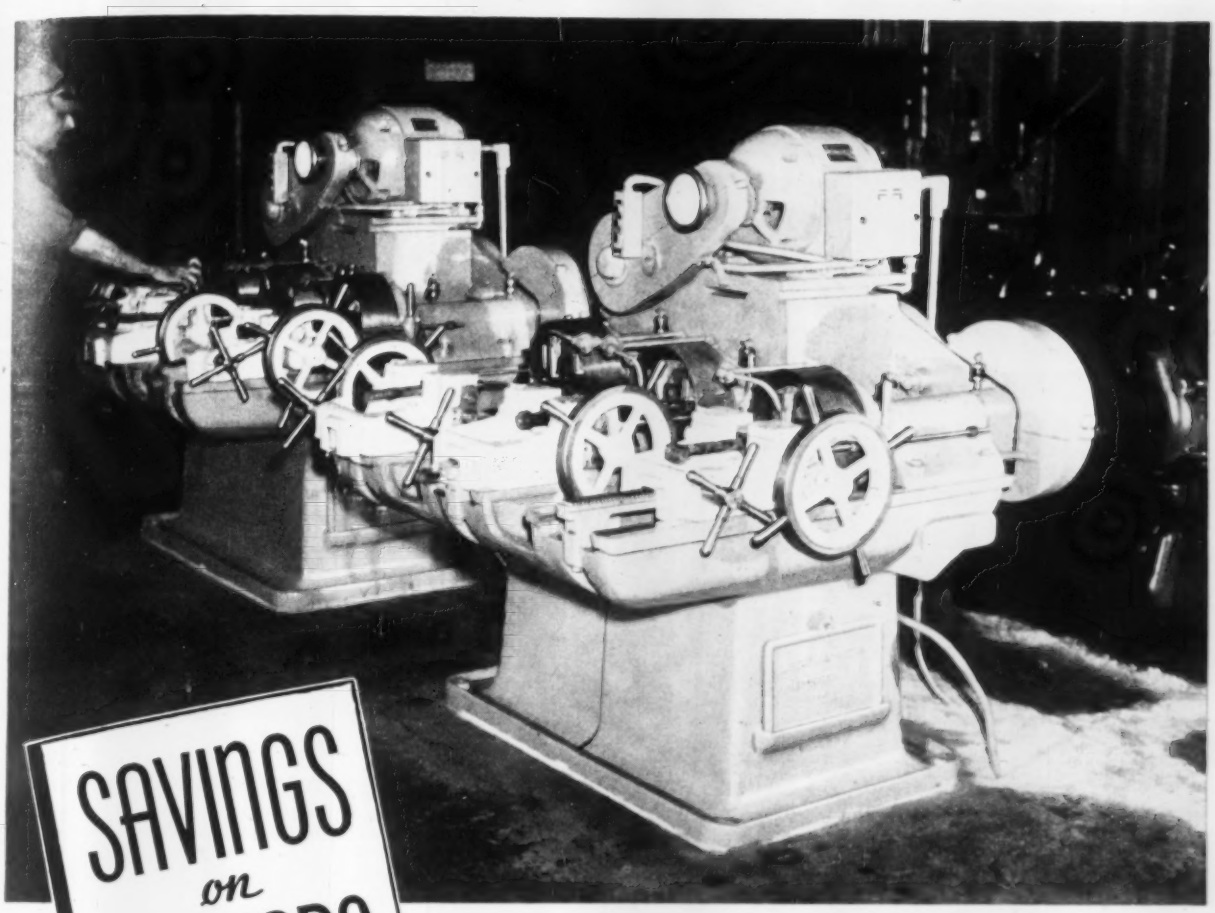
Puzzle Corner

As you soon discovered, the field in the Mar. 12 problem was immense—77,440 acres—and required 77,440 boards to fence it. First in with the correct answer to that one were Charles E. Norton of National Malleable & Steel Castings Co., J. L. Gibson and E. Goehring of Borg-Warner Corp.'s Calument Steel Division, James S. Miller of Armco Steel Corp. and C. I. Gardner of Orinoco Mining Co.

Al and Bill are each in a rowboat. Each boat is connected to a pier by a rope 50 feet long. Al's rope is tied to the pier, but Bill's is held by Charley who stands on the pier. To get back to the pier, Al and Bill each pull hand over hand with equal force. Charley also pulls. Who reaches the pier first, Al or Bill?

Shrdlu

(Metalworking Outlook—Page 37)



SAVINGS on THREADS

LABOR & MACHINE COSTS CUT IN STANDBY MAINTENANCE

The photograph above shows two Landis 1½" Triple Head Threading Machines shortly after installation in the maintenance shops of the Chicago, Burlington, and Quincy Railroad. They are used exclusively for threading 1¼" steam engine bolts. Large savings in capital invested in heavy machinery and hourly labor costs were effected by the installation of these Landis machines. Two Landis machines now do the work previously done by four machines of another type. Two men are now required to operate the machines—four men were previously required.

For Further Information and Specifications write for Bulletin B-79

LANDIS
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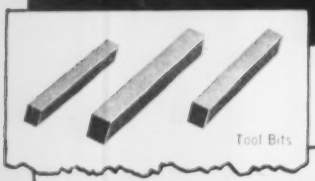
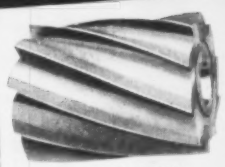
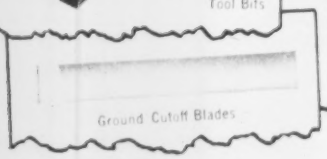
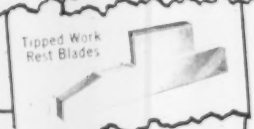
If you buy Cutting Tools

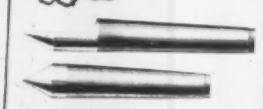


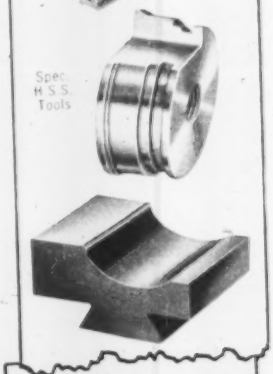






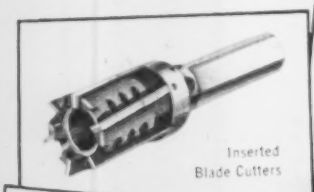
HERE'S HELP FOR YOU!

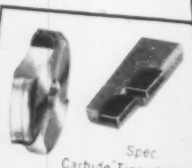




Are you responsible for purchase or specification of cutting tools —or wear and abrasion-resistant parts? You'll find the *Gorham* Tool Catalog a *helpful time saver!* 120 pages, packed with useful information, describe and illustrate the complete *Gorham* line—*PLUS* an informative section of Engineering Data. Request your free copy on company letterhead.

We also offer the service of *Gorham* field engineers, whose counsel in specification and design for special tooling problems is yours for the asking. Their recommendations are backed by *Gorham's* 25-year background in tool design, manufacture and heat treatment. Write for the name of your nearby *Gorham* representative.





Gorham
TOOL COMPANY
14401 WOODROW WILSON
DETROIT 3, MICHIGAN

LETTERS
TO THE EDITORS

What's Up?

What manufacturers supply the aircraft industry with steel scaffolding shown under erection at Consolidated Vultee, STEEL, Feb. 19, p. 37.

V. R. Harrod
The Babcock & Wilcox Tube Co.
Alliance, O.

• *Consolidated Vultee reports most scaffolding is built in their own plant. They buy a small quantity from the Up-Right Scaffolding Co., 1013 Pardee, Berkeley, Calif. For names of additional companies supplying scaffolding to the industry, we suggest inquiries to other major airframe manufacturers.*

Lubricate with Wax

What organization developed the wax lubricants mentioned in "Production and Engineering News at a Glance," STEEL, Mar. 5, p. 79?

A. J. Heag, supervisor, finishing department
Wire Goods Plant
Risdon Mfg. Co.
Naugatuck, Conn.

• *S. C. Johnson & Sons Inc., Racine, Wis.*

Generation of Folly

Your editorial, "Twice in a Generation," STEEL, Mar. 5, p. 47, sums up all the political folly perpetrated on the American people since 1917. I am forwarding a copy to the news bureau, American Bankers Association, and hope it can be presented to the association members.

P. S. Shoemaker, executive vice president
Allegheny Trust Co.
Pittsburgh

Your recent message, "Twice in a Generation," made an extremely favorable impression. We will distribute 1200 reprints to our employees.

H. vonP. Thomas, merchandising manager
Bussmann Mfg. Co.
St. Louis

Briefing LPG Buyers

Request permission to reproduce your cover article, "Refinery Waste Moves into the Big Time," STEEL, Feb. 5, 1951, in data books sent to leading buyers of LP-Gas equipment. We feel that this material will be of great interest to the industry.

John A. Grandland
Bastian & Blessing Mfg. Co.
Chicago

• *Permission granted.*

Lock Nuts: Their Operation

Who published "Types of Lock Nuts and their Operation," noted in STEEL, January 29, p. 68.

Edward Dudis
Dayton, O.

• *Industrial Fasteners Institute, 3468 Euclid Ave., Cleveland.*

The Metalworking Outlook

The Scar Still Shows

Labor is patching up differences with Defense Boss C. E. Wilson, but the rift still shows. Even if union chieftains return to the defense organization, they will continue to lead an organized rebellion against price and wage controls. They are marshalling farm, small business and consumer support. Probable results: Controls will continue, but they'll be less tight than they are now.

New Machine Price Order Due

A machinery price order now in the final screening stage will arouse resentment if promulgated in its present form. The base price is set as the highest quotation asked in the first half of 1950, plus added materials and labor costs that have come since then. The order will permit no increase resulting from higher engineering, administrative or other overhead costs. There's only a faint chance that OPS will reconsider before making the ruling effective.

Scrap Gets Tighter

NPA may have to devise a formal ferrous scrap control plan. The agency has been allocating the materials mostly on a spot assistance basis for the past month. Shortages are worsening, particularly in the Ohio valley and eastern Pennsylvania. Some steel producers in those areas have less than a week's supply . . . Expect few changes in a forthcoming order modifying the price controls on iron and steel scrap.

Higher Corporate Taxes by July 1?

A good bet: Higher corporate income tax rates probably will go into effect July 1. It's unlikely that Congress can act on the matter until late summer, but the law will be made retroactive to the July date. Individual income tax increases will not be made retroactive and may not go into effect until Oct. 1. The Treasury asked for both individual and corporate boosts to go into effect Jan. 1, 1951.

Shhhh! It's Secret

Complaints are increasing among metalworking men about the growing volume of Defense Department material that's classified. Their argument: Some information should be restricted, but Defense is going hog-wild and classifying technical data that has been common knowledge for more than a year. One result: Manufacturers are slowed up in their conversion while they wrestle with red tape surrounding restricted technical information they need.

Higher Compression Engines Nearer?

Higher compression auto engines may be nearer. Adding a small amount of a boron compound to a gasoline containing lead has been found experimentally to lower octane requirements by 5 to 20 points

Production-Engineering News — p. 73 The Market Outlook — p. 137

for knockfree motor operation. Standard Oil of Ohio has a discovery that, if proved commercially, could mean earlier appearance of high-economy auto engines with compression ratios up to 12.5:1, hitherto believed to demand ultra-high octane fuel.

Working Out: Chrome Stainless

Switches to 430 stainless steel, a straight-chromium type, from the chrome-nickel grades are underway on a fairly broad scale and are throwing added pressure on supply which is limited primarily by finishing capacity. While 430 is a little more difficult to roll and fabricate than the 18-8 chrome-nickel, it is less expensive, and takes a better finish. There are no NPA restrictions on chromium yet, and ferrochrome for steelmaking is in good supply. One drawback: A chromium order may come soon, probably in the form of inventory restrictions.

More Shipbuilding Possible

No enormous shipbuilding program is contemplated for the near future, but don't discount a large program eventually. Forty-one old Liberty ships have just been demothballed, and that means the U.S. is poking in the bottom of its reserve fleet barrel because the Liberties are slow and otherwise undesirable. All newer, faster ships have already been taken out of reserve. Washington is worried about shipping and has established a National Shipping Authority in the Commerce Department to make better use of the American merchant marine.

Straws in the Wind

Chrysler Corp. may build a plant near Burlington, N. J. . . . Steel containers will replace more wood and cardboard containers as materials handling men seek to curb pilferage losses . . . At least two television set makers have lowered some prices to move their models . . . Watch for a tightening up on inventory loans.

Goings-on in Industry

Enough iron ore, coal and limestone is available to support the steel expansions (p. 45) . . . NPA estimates that 82 million tons of finished steel will be available to consumers in 1951, compared with 72 million in 1950 (p. 47) . . . The semi-essential farm implement industry may have business for parts suppliers (p. 49) . . . Defense Department obligated $19.7 billion in the first eight months of fiscal 1951 for hard goods, construction and facilities expansion and clothing, subsistence and petroleum products (p. 51) . . . Europe, excluding Russia will have the capacity to produce nearly 82.5 million net tons of ingot steel by 1953 (p. 55) . . . The CMP policy is tangled as the target date nears (p. 57).

Foresight Pays Off

In some quarters the rapid development of new plans for the expansion of steel ingot capacity has raised the question as to whether or not we will have the raw materials necessary to support the operation of these facilities. Specifically, can we mine, transport and process enough iron ore, coal and limestone to produce 117.5 million tons or more of steel ingots by the end of 1952?

The answer is "yes." It reflects credit upon the foresight of officials of many companies who made ambitious plans long before the Korean invasion incited the present emergency. The timing on some of the far-flung projects to tap new sources of raw materials may be nip and tuck, but there is a sufficient factor of safety to allay all fears.

By 1955 the Lake Superior region still will be supplying more than 70 per cent of the nation's requirements for high grade iron ore. In that year the first important shipments of commercial taconite concentrates will be received at lower lake docks. By 1960 these shipments will have totaled 20 million tons. Natural ore from other domestic deposits will total at least 18.5 million tons a year. Bethlehem's Venezuela concession will be supplying 3 million tons a year by 1953 and U. S. Steel's concession in that country will be shipping ore by 1955 or later. Republic's Liberian deposits will ship a few hundred thousand tons this year, with sharply increased deliveries in subsequent years. Ore from the rich Labrador field will begin flowing to furnaces at the rate of 2 million tons in 1954, 5 million in 1955 and 10 million in 1956. In addition are possible shipments from new sources in Canada and from established mines in Chile and Sweden.

There are abundant supplies of coal and limestone, but certain problems of transportation must be solved in order to make these materials readily available. Judging all of these prospects in the light of past performance, it is apparent that the American steel industry will have whatever is required to support its augmented capacity during the next decade.

E. L. Shaner

EDITOR-IN-CHIEF

WAS THIS NECESSARY? Until recently the lists of defense contracts issued periodically by the Department of Commerce contained the name and address of the contractor, the kind of goods or services ordered, the quantity in units or other physical measure, and the dollar value of the contract. This information was helpful to potential subcontractors because it enabled them to spot instantly those prime contracts on which they might seek subcontracts.

For reasons which are said to involve "se-

curity," the department now deletes the quantity and dollar value of the contract. Without this information, potential subcontractors find it almost impossible to determine whether any prime contract listed is worth his investigation. One wonders whether "security" really warrants the withholding of this information or whether somebody in authority is being supertechnical. The deleted lists are of little if any value.

—p. 50

* * *

OFFSET TO INFLATION: From information presented by a number of speakers of early technical sessions of the Western Metal Congress and Exposition in Oakland, Calif., last week, it is evident better materials and improved processes will play important roles in the current aircraft building program.

A materials and process engineer described new aluminum rolling and extrusion processes which promise to reduce materially the man-hours of airplane fabrication. Another aircraft engineer reported that three steel producers are furnishing new high strength steels with excellent ductile and impact resistance properties which can be used advantageously for landing gears and similar parts. Also new precipitation-hardening stainless steels are available which have the important advantage of being formable in a softer-than-final-strength condition.

Improvement in materials and processes is one way of offsetting in some degree the terrific factor of inflation that is present in every defense contract. The nation's engineers and metallurgists deserve great credit for their zeal in meeting this challenge. —p. 49

* * *

FRINGE ITEMS 21%: Significant information on the cost of an hour's work is found in the annual report of U. S. Steel for 1950. In 1936 the cost was 70 cents, of which 66 cents was for straight time and 4 cents was for fringe benefits. As of December, 1950, total cost was $2.11, of which 37 cents was for fringe benefits. Thus fringe items amount to more than 21 per cent of the straight time hourly wage.

On the basis that the average for 1935 through 1939 equals 100, the hourly employment cost rose to 258 in December, 1950, whereas the cost of living advanced to only 179. Also, on the basis that the figures for December, 1936, equal 100, the cost of an hour's work rose to 282 in December, 1950, whereas steel prices went up to only 183.

These figures definitely refute the prevailing lament voiced so frequently in Washington that the cost of living has outdistanced wage rates and that steel prices are too high. —p. 50

* * *

BUILD-UP FOR A GOAT: Some Washington observers are disturbed over the powerful drive being organized by union labor chieftains to discredit industrialists and businessmen who have been persuaded to accept positions in the government during the present emergency. The campaign is designed to convince the American people that the defense program is in bad hands, that mistakes follow mistakes and that policies are being pursued which benefit industry at the expense of other interests.

It is difficult to combat some of this unfair propaganda. The man in the street is critical of many things being done in Washington, but he has no way of knowing who is to blame for them. The unions are trying to develop an artificial goat upon whom he can vent his protests. The only effective counter-offensive is to spread the plain truth far and wide and as promptly as possible. —p. 52

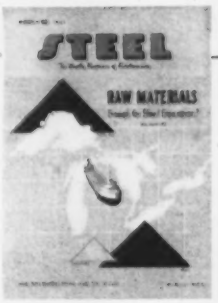
* * *

SAFEGUARDS DRAWINGS: Ford Motor Co. officials figure that it would be extremely difficult to maintain operations without the millions of drawings of dies, gages, jigs, fixtures as well as the engineering drawings of all cars, trucks and engines dating back to Model T days. Therefore, as part of the company's security program, 1,250,000 microfilms of blueprints and drawings have been made in the last two years and present plans call for microfilming at least 3 million additional prints. When the job is completed Ford will have 2 million engineering prints, 2 million manufacturing engineering prints and 250,000 plant engineering prints—all in its microfilm library. All negatives are stored in secret vaults well removed from River Rouge.

The Ford precautions may well prompt other manufacturers to inquire as to whether or not their important drawings are properly safeguarded. —p. 60

Raw Materials: Outlook Good

Steel production is not likely to be hindered seriously by shortages of ore, coal or limestone in 1951. The worst ore scarcity will probably occur next winter



The answer to the question posed on the cover is: Yes, probably. The "if" is transportation; above all, Great Lakes vessels that carry the bulk of the iron ore and limestone needed by the steel industry. And additional freight cars are required, too, as steelmen are forced to resort more and more to rail transportation. Rail shipments of ore from the Lake Superior district will continue all next summer and winter to keep up with hungry furnaces

MRS. SMITH can go next door to get the flour, eggs and milk to finish the cake she has half completed.

The steel industry has to go farther and farther afield to get the ore, coal and limestone it requires to continue operations, but it has enough supplies lined up to manage even a little frosting on the production cake. Shortages in those raw materials won't be a factor that will prevent steel furnaces from producing at a record annual rate of 117.5 million ingot tons—or better—by the end of 1952.

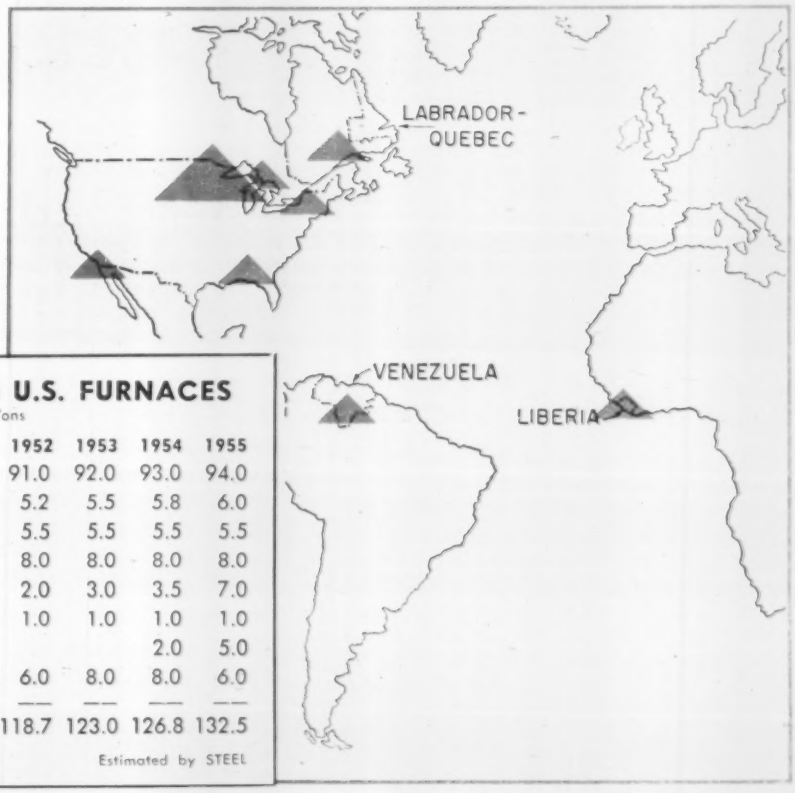
The Scoreboard—Take a look at STEEL's estimates of iron ore available to U. S. furnaces in the next five years. You'll see that even by 1955 the Lake Superior District will still be supplying more than 70 per cent of the material. This year, 78 per cent will come from the Lake Superior area. M. D. Harbaugh, vice president of Lake Superior Iron Ore Association, points out that the Lake Superior district is being "depleted gradually, but not alarmingly." Ore experts agree that high grade Superior ores, supplemented by Superior taconite, tonnages from other parts of the U. S. and imports from Venezuela, Labrador-Quebec, Liberia and other areas will be enough to support the steel expansion.

Taconite—Iron ore pellets, concentrated from low grade taconite, will not be available in any large tonnages until late in 1955. Reserve Mining Co. will build the first full-scale commercial taconite processing plant in history at Beaver Bay, Minn., says American Iron & Steel Institute's *Steelways*. The unit, scheduled for completion by 1955, will cost about $70 million and will produce 2.5 million tons of the pellets annually. A few boatloads may be shipped in 1955, but large shipments will not be possible until the latter half of this decade. By then other firms interested in taconite, including Erie Mining Co. and U. S. Steel, may be in full commercial operation. An estimated 20 million tons of the pellets will have been produced by 1960.

At Home—Other U. S. ore deposits in the West, South and East will continue to be the source for a surprisingly large tonnage—at least 18.5 million a year. Production from the Eastern District shows signs of the greatest increase, partly because Bethlehem Steel Co. will develop an underground mine near Morgantown, Pa., where low-grade deposits may be concentrated to 65 per cent iron. Bethlehem also has an option on the newly discovered Marmora field near the Canadian side of Lake Ontario.

In Venezuela—The 1 million tons due from Venezuela this year will be shipped from Bethlehem's concession. The company is off to a flying start down there and should be shipping at the rate of 3 million tons a year by 1953.

U. S. Steel's Venezuelan concession still requires a lot of work, and



IRON ORE AVAILABLE TO U.S. FURNACES

In Millions of Gross Tons

FROM:	1951	1952	1953	1954	1955
Lake Superior District*	90.0	91.0	92.0	93.0	94.0
Eastern District	5.0	5.2	5.5	5.8	6.0
Western District	5.5	5.5	5.5	5.5	5.5
Southern District	8.0	8.0	8.0	8.0	8.0
Venezuela	1.0	2.0	3.0	3.5	7.0
Liberia	0.3	1.0	1.0	1.0	1.0
Labrador-Quebec				2.0	5.0
Other Imports	4.0	6.0	8.0	8.0	6.0
TOTAL	115.8	118.7	123.0	126.8	132.5

* Including Canadian Ore to U. S.

Estimated by STEEL

the earliest possible shipments would not come until 1955.

Off to Africa—Republic Steel Corp. expects to complete a railroad to its Liberian deposits in Africa in about two months. Tonnage will be ready this year, but adequate shipping will be the problem until next fall when Republic will have ocean-going vessels completed. Until then, the company will depend on tramp steamers to bring the ore across. Probably only 250,000 to 300,000 tons will be brought to the U. S. this year.

In Labrador—Contemplated iron ore shipments from Labrador-Quebec may begin in 1954 with 2 million tons; 5 million tons will be shipped in 1955 and 10 million in 1956. Operator of the concession is Iron Ore Co. of Canada, owned by M. A. Hanna Co., Hollinger interests of Canada, and five American steel companies—Armco, National, Republic, Wheeling and Youngstown Sheet & Tube. As it looks now, about 20 per cent of the Labrador production will go by ocean vessel to Baltimore and Philadelphia, about 50 per cent will go to Lower Lake ports by 2000 and 2500-ton boats; about 30 per cent will be transshipped from Montreal by rail to westefn Pennsylvania, West Virginia, Ohio and Kentucky. Hanna will sell part of the tonnage to companies with no financial interest in the concession.

Still Economical—If the St. Lawrence Seaway is not built or until it is, Hanna will make use of the waterway commerce already in existence from the Great Lakes through the St. Lawrence. Relatively small vessels of 2000 and 2500 tons now go loaded from West to East through existing canals but currently return light from East to West. The small boats will welcome a cargo from East to West.

Hanna is going ahead on schedule with construction. It has an engineering and contracting force of about 800 in the field. Some $5 million worth of construction equipment was sent in last fall. A 365-mile railroad will be built from the concession to Seven Islands on the St. Lawrence. The five-and-a-half-month mining season will start late in May, but shipments from Seven Islands can continue for six and a half months because stock-piles will be built on the St. Lawrence.

Major sources for other ore imports are Chile and Sweden.

Protected—Even if the weather delays opening of the 1951 Great Lakes shipping season until the middle of April, the nation's blast furnaces will have enough iron ore, for stocks today are an estimated 18 million gross tons. About 7 million tons of ore are consumed a month, so even by late April there would still be 11 million tons on hand should the lake freighters yet be ice-bound. Some ore grades may be short at individual furnaces, but operators can balance stocks by trading around.

The comfortable ore position now is partly the result of record all-rail movements. In 1950, a peak of 3,971,615 tons were moved by rail from the Lake Superior region to U. S. furnaces. U. S. Steel Corp., the only company shipping all-rail in the winter, hauled an estimated 550,000 tons from Jan. 1 to Mar. 10, 1951. On Mar. 10, the corporation had agreed to return much of the railroad and thawing equipment to northern mine operators from whom it had borrowed the apparatus. U. S. Steel will probably continue its winter rail project during next season.

Carl McDow

COMBINED BOAT AND RAIL SHIPMENTS KEEP MILLS GOING

. . . by 1955 lake ore-carrying capacity may be 94 million tons

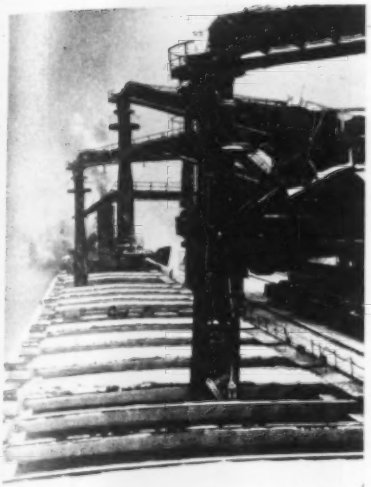
Shipping Strain — Rail shipments from Lake Superior will probably be necessary all next summer, too, because Great Lakes vessels are scarce. The 264 vessels in the American fleet have a capacity of slightly more than 2.6 million tons per trip. In a good year, a vessel can make about 32 round trips a season. The American fleet's carrying capacity in 1951, then, is about 84 million tons. That potential is augmented by about 20 Canadian carriers that are available on lease during part of the season.

The consensus is that the lake shipping shortage will be considerably relieved in 1952 and over by 1953 because of the big carrier-building program. Fifteen ore vessels now are or soon will be constructed for American owners and two for Canadian. None of the units will be ready this year, but more than half will be operating in 1952; all will be ready by 1953. Pittsburgh Steamship Co. has three on order; Oglebay Norton & Co. two; Interlake Steamship Co. two; Cleveland-Cliffs Iron Co. one, Hutchinson & Co. one; National Steel one; Bradley Transportation Co. one; Boland & Cornelius one; Ford Motor Co. one; and Bethlehem Steel Co. two. The last two will be built at Bethlehem's coast yards and brought to the Great Lakes via the inland waterway. All the others will be constructed at Great Lakes yards. The two Canadian vessels are being built for Canada Steamship Lines Ltd. and Upper Lakes & St. Lawrence Transportation Co. Ltd.

Enough Leeway—The new American carriers will have a capacity of at least 18,500 tons each. That means a trip capacity of more than 278,000 tons. In a good 32-trip season, those 15 boats could bring down about 8,896,000 tons. That plus the already existing capacity and leased Canadian potential would be adequate even for the 1955 season when an estimated 94 million tons may be brought down by boat from Lake Superior.

Coal Headache: Freight—Freight is the major limiting factor in the availability of coal for the steel industry, too. There are enough freight cars to haul the 560,000 tons of soft and 50,000 tons of hard coal that will be mined in 1951, but the outlook for the future is less promising. Railroads own 850,000 open-top cars, but very few of the new freight units to be built are designed for coal. That's of concern to coal producers who know they'll need to ship more fuel in 1952 to support the steel expansion. Mining machinery now is plentiful, but maintenance, repair and operating items are scarce. Some of those factors may cause a coal shortage even though underground reserves are ample for the foreseeable future. At the moment, coal stocks throughout the nation are above average, at about 74 million tons.

Developments in coal processing



Carl McDow

FAST HANDLING NEEDED
. . . tie-ups mean less tonnage

are a gradual process. Virtually every coke producer today has to wash coal to get rid of the steadily rising sulphur content.

Best coking coal comes from central and western Pennsylvania, southern West Virginia, and eastern Kentucky.

Paradox—Coke is a tight item despite good supplies of coal. A shortage of coke ovens causes that situation, but a coke expansion program will relieve the scarcity by 1952. Bureau of Mines estimates that 78.5 million tons of coke will be produced in 1951; 72,098,000 tons were made last year.

The bureau figures approximately 80.8 million will be needed in 1951, but many industry men think that estimate a little high. The bureau bases its figures on a production of 107 million ingot tons of steel in 1951—possible but not probable. The bureau believes 84.8 million tons of coke will be needed by 1952, based on a steel production target of 114 million tons.

This year, about 8 million tons of the 78.5 million-ton coke output will be produced in beehive ovens to eke out the usual byproduct type of production.

The Same Story—Freight again may limit limestone supplies in 1951. Not enough was brought down in the 1950 lake shipping season, so some users had to resort to rail movement this past winter. The lake boat situation will be just as tight in 1951, so limestone quarrying firms are bracing for a rugged summer. The stone exists to support steel expansion, but the problem is to get it quarried and transported. New quarries are being opened, one by Kelley Island Lime & Transport Co. at Rockport, Mich., where a new plant will be built. Railroad cars are also in short supply.

Some 30.3 million tons of metallurgical grade limestone were shipped in 1949; an estimated 34.8 million tons were used last year. Even more will be needed in 1951. About 25 stone producers account for 85 to 90 per cent of all output. Most quarries supplying steel mills are in the Great Lakes, Youngstown, Pittsburgh, central Pennsylvania and Martinsburg, W. Va., areas.

The steel and supporting industries that supply raw materials know where they can get the wherewithal to make metal for hungry steel consumers. But the question is: Can they get the wherewithal to the right places? The basic producers have always in the past averted a violent steel famine—although narrowly at times. They think they can do it again.

BETHLEHEM IN VENEZUELA
. . . the loading docks are busy

NPA Eases Up on More Steel Controls

For the time being, it will issue no more quantitative restrictions because it estimates a record 82 million tons of finished steel will be available in 1951

NATIONAL Production Authority estimates that 82 million tons of finished steel will be available to consumers in 1951, compared with about 72 million tons in 1950.

NPA believes domestic production will be 80 million tons of finished, supplemented by 2 million tons of imports. So jubilant is NPA's Iron & Steel Division with the brighter steel outlook that it has abandoned for the present a number of proposed actions which would have subjected steel producers and consumers to more controls.

Change in Plans—A contemplated order which would require conversion of more continuous strip mills to plate production will not be issued now. Reason: January plate shipments rose to a phenomenal 630,590 tons, compared with 551,126 tons in December, 540,110 in November, 541,865 in October. Plate production probably will be hitting 700,000 tons a month by the end of June, and that tonnage will be adequate, NPA believes.

Set-aside steel quotas between now and June can be managed in such a way as to require steel mills to convert enough flat-rolled capacity to get the required plate. Gradual conversion has occurred already (see STEEL, Mar. 19, p. 37), but despite that, sheet and strip shipments also increased in January over December. That paradox is explained by the fact that deliveries for virtually all major product classifications jumped in January. The extent of conversion of sheet and strip facilities to plate is indicated by this: Record flat-rolled shipments in January were 8.2 per cent more than in December, but plate deliveries climbed 14.4 per cent.

Quantity and Quality—Brighter steel production prospects mean that, for the time being, no further reductions will come in the amount of steel which may be used for the manufacture of civilian end-products. The only quantitative cut is that now in effect under NPA Order M-47 which limits manufacturers of consumer durable goods, including automobiles, to 80 per cent of the steel they consumed in the base period.

The only new restrictions likely to be applied to steel consumers in the near future will be qualitative. Users will have to turn more to substitutes for alloy steels, even if the alternates will not give as satisfactory performance as the original alloy material. Steel, generally, may be in a little better supply, but alloying elements—nickel, cobalt, tungsten, columbium and molybdenum—are as tight as ever. Molybdenum is particularly hard to get.

Explanation—Here's why NPA is so optimistic about steel: Shipments reached an alltime peak in January, totalling 6,907,608 tons.

This amount exceeds the December total by nearly 500,000 tons and topped the previous record, made in October, 1950, by 400,000 tons.

these were increase of 7 and 6 per cent, respectively, which were greater than the percentage rise in ingot output, says the American Iron & Steel Institute.

Shipments of alloy products other than stainless set a monthly record except for wartime, the total in January being 492,323 tons.

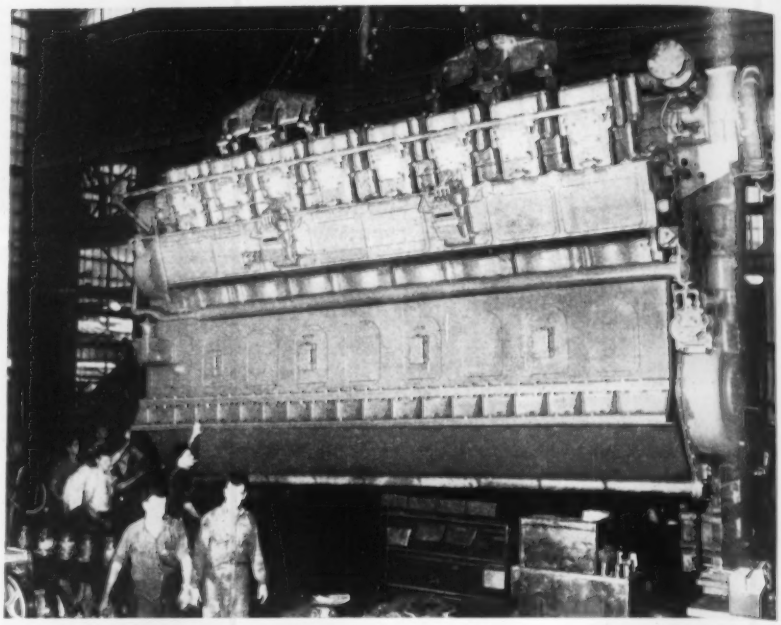
Weirton To Build Stack

Weirton Steel Co. will build a 1200-ton blast furnace at Weirton, W. Va. Company has received a certificate of necessity for $15.4 million for expansion of pig iron facilities.

Weirton's blast furnace capacity currently is 1,240,000 tons from three stacks.

The new stack will have a monthly capacity of 36,000 tons and will raise annual capacity to about 1,670,000 tons.

Existing coke facilities are believed adequate to supply the new stack. Weirton has 237 by-products ovens with 1,400,000 tons capacity at Weirton and 136 beehive ovens with 120,000 tons capacity at Isabella, Pa.



POWER PACKED: Using natural gas for fuel, this supercharged internal combustion engine will deliver 3700 horsepower. Forty of the 100-ton engines have been ordered from Cooper-Bessemer Corp., Mt. Vernon, O., by Reynolds Metals Co. They will be used to generate electricity for Reynolds' new aluminum reduction plant to be built near Corpus Christi, Tex.

Freight Rate Boosts

After Apr. 4 you'll have to add about 2.4 per cent to shipping costs

INTERIM rail freight rate increases on iron and steel go into effect Apr. 4. A 4 per cent boost will be permitted in Eastern classification territory (roughly east of the Mississippi river and north of the Ohio). A 2 per cent hike goes into effect in southern and western territories and on interterritorial shipments among the three areas. As usual, a 3 per cent federal tax will be applicable to the total cost of the transportation.

Regulations governing disposition of fractions and applying to the resulting rate after the increase is calculated on the base rate are: Nearest quarter cent on rates of 5 cents or lower; nearest half cent on rates over 5 cents up to and including 10 cents; and the nearest full cent on rates over 10 cents.

Scrap and pig iron take the same rates as finished iron and steel products and coal and coke take a 2 per cent increase with a maximum of 7 cents on a net ton basis and 6 cents maximum when figured on a gross ton basis.

Iron ore is also governed by the same increases as apply to iron and steel, scrap and pig iron, although there is no increase on ore rates above the Great Lakes and no increase in handling charges at the ports.

Proposed increases in freight rates and charges generally are expected to yield approximately $205 million a year.

Changes were authorized by the Interstate Commerce Commission in a report on the interim-relief phase of the Ex Parte 175 proceeding. Increases will average about 2.4 per cent overall, as compared with 6 per cent asked by the railroads.

Motor Prices Get Face Lifting

Base prices listed by virtually all electric motor manufacturers are being carried on a new schedule. Since the first week in March they have doubled base prices of a year ago but have raised discounts proportionately so that net prices are virtually unchanged.

It's a step toward reducing the amount of work necessary in the event of a price change.

Doubling the base price of a year ago and increasing the discount gives motor builders more working room in the event of future price changes. Instead of having to publish a new price book the next time there is an increase or decrease, all the motor builders will have to do is notify his customers that effective a certain date discounts from the base price will be so many percentage points more or less.

Machine Tools Tighter

If you have no rated order, your chance of getting delivery this year is slim

WHAT are chances of obtaining machine tools and other critical metalworking machinery in the near future if you have no defense or defense-support business?

Very slim, say NPA spokesmen. NPA Order M-41 provides that 70 per cent of the production of each size machine tool will go to the armed services and that the remaining 30 per cent may go to purchasers with both rated and non-rated orders. That means a limited number of tools, at best, will be delivered on nonrated orders.

Long Wait—In general, says an NPA official, consumers should not expect to be able to get machine tools and other critical metalworking machinery on nonrated orders before next year. The pool orders will keep most builders occupied all through 1951, and some of them will have a carryover into 1952. Says this official: The builders will do well to book orders where nonrated buyers are willing to wait until next year for delivery. Some already have started to build up 1952 order books, writing contracts to provide for all contingencies.

To smooth the path of both buyers

and sellers in providing for a continuance of machine tool production after pool orders have been filled, some pressure has been brought to bear on the Office of Price Stabilization to announce a price policy on machine tools and related machinery. OPS has indicated it will come out with something along that line within a week or so.

Big Job—The first batches of pool orders have been written by General Services Administration and are being sent to builders. Each is accompanied by authorization to use a DO rating to obtain materials and components. Due to the magnitude of the operation, it should take about six weeks before all builders receive their pool orders.

More Economical Planes

Competition is resulting in better design, fabrication and assembly techniques

U. S. IS well on the way to getting better aircraft built more economically. Rapid advances in basic aircraft design, airframe fabrication and assembly techniques are resulting from increased competition within the industry.

That was brought out in talks presented by engineers of leading aircraft companies at the Western Metal Congress and Exposition in Oakland, Calif., Mar. 19-23.

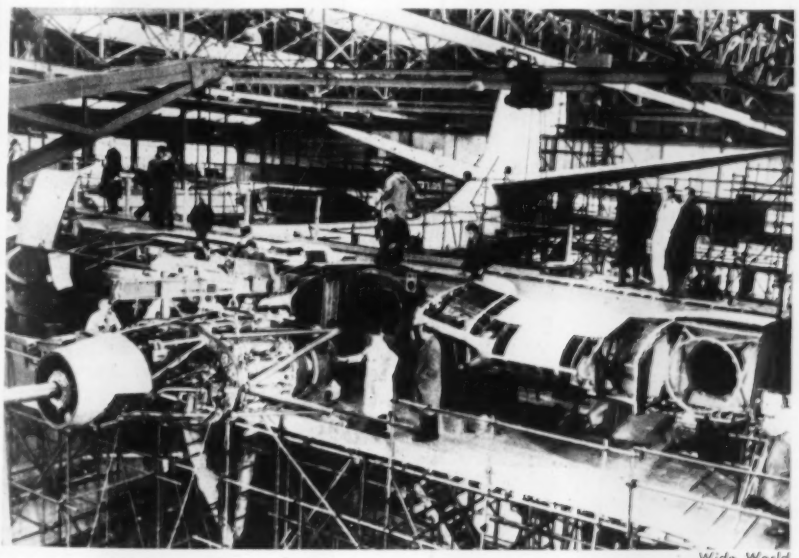
Mechanized—Tom E. Piper, chief materials and process engineer for Northrop Aircraft, builder of the F-89 Scorpion, told about development to a commercial stage of new aluminum rolling and extrusion processes which promise to take many tedious man-hours and high labor costs out of airplane fabrication.

These rolled and extruded sections have high physical properties and will carry high compression stresses even with widely spaced supports. Much of the usual riveting of internal spars and bracings is eliminated and far more rapid production rates are possible than with present flat sheet materials and production methods. Uses for new sections include fuselages, bulkheads, floors, side panels and bottoms of flying boats. A possibility is even seen for extruding the complete fuselage of guided missiles as cylinders.

New Steels—Leo Schapiro of Douglas Aircraft said that U. S. Steel, Crucible and Republic now offer 230,000 psi strength steels with ductility and impact resistance equalling that of 180,000 psi SAE 4340 steel. These new steels can be used for landing gears and other parts.

In further discussing materials and their substitutes, Mr. Schapiro said forming operations with hard temper 18-8 stainless steel is more than a headache. But the newer precipitation-hardening stainless steels such as Stainless W, Rezistal 3311 and Armco 17-7 PH offer desired high strength and oxidation resistance plus particular advantage of being formable in a softer-than-final-strength condition.

Large attendance at technical sessions and 170 exhibits reflected growing importance of the West in metalworking. California now is third in number of such plants and eighth in total volume.



Wide World

POWER FOR A PRINCESS: Workmen at Cowes, Isle of Wight, are fitting the first pair of engines into one of the three Saunders Roe Princess flying boats. The ten-engine aircraft are the largest ever built by Britain

Market for Components?

The semi-essential agricultural implement industry may have business for parts suppliers

PRODUCERS of components for civilian goods soon to be curtailed may find an outlet for their capacity in the semi-essential farm equipment field. But there is no gravy train.

The chances for a large number of new suppliers to get into this $2 billion market depend on present subcontractors becoming loaded with defense work and on finding steel. Farm equipment parts buyers are now beating the bushes for certain components, and can expect to do more of it in the second quarter.

Big Business—Dollar-wise, farm implement makers generally buy more components from independent suppliers than they make themselves. Extremely cost-conscious, they subcontract most parts that can be made cheaper on the outside. This practice leaves a large portion of the field open to small specialty shops.

Nearly all electrical equipment used on farm machinery is bought from outside suppliers. Bearings, hydraulic equipment, screw machine products and disk blades are turned out for the industry by specialty firms. Engine parts and accessories and power transmission parts are often farmed out. Stampers, forgers and suppliers of malleable and gray iron castings have the best chance of shifting to the farm field—if they have the raw materials. Components in demand are bolts and nuts, disk blades, engines, steel forgings and rubber products.

Gray Market—Production and sales of farm equipment are booming. Paul M. Mulliken, managing director of the National Retail Farm Equipment Association, has told the House agriculture subcommittee that increased quantities of new and slightly used machinery are being distributed through irregular channels.

While production of agricultural machinery has not been curtailed by the government, it has not yet been helped with any priority assistance. Steel deliveries in most cases are behind schedule, and sometimes have been cut off entirely.

Help Wanted—Leaders in the farm equipment field have told the Department of Agriculture that unless they are given assistance, materials shortages will reduce production this year to only 40 per cent of 1950.

Recommendations are sought to have National Production Authority divert a portion of steel output—about 3½ per cent—to implement manufacturers. Pressure is being put on to give them top ranking under the Controlled Materials Plan after defense and defense-support items are scheduled.

Fringe Costs Hit New High

U.S. Steel's annual report reveals it pays 37 cents an hour for fringe items

U. S. STEEL Corp. pays 37 cents an hour per employee for fringe items. That's 21 per cent of the average straight time rate—$1.74 per hour—that prevailed as of December, 1950.

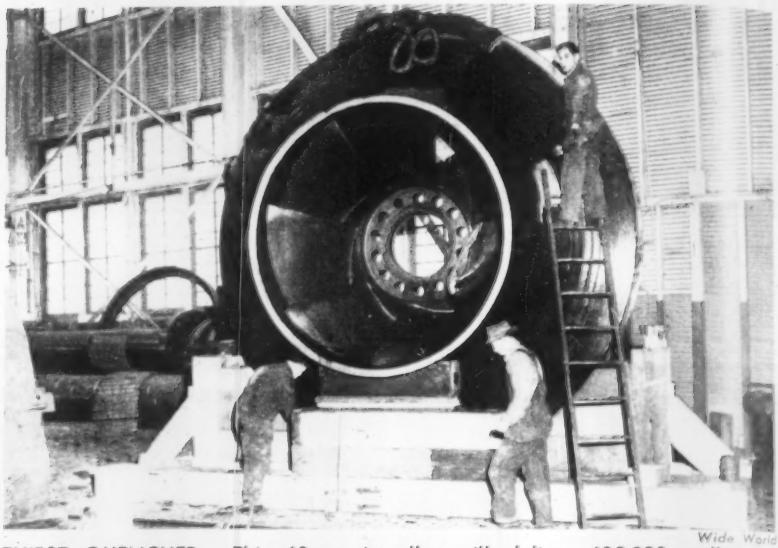
In its 1950 annual report, U. S. Steel reveals it pays 8 cents an hour per wage earner for overtime and holiday premium, 3 cents for social security taxes, 12 cents for vacation and other fringe items and 14 cents for pensions and insurance, not counting amounts paid toward the past service cost of pensions.

Disproportionate Increase — The straight time hourly wage of U. S. Steel's average steel mill worker for 1950 was nearly two and a half times the rate paid in 1936, but the fringe costs were eight times as great. would be nine times as great if last December's fringe costs were continued at an annual rate.

In 1936, the corporation's fringe costs amounted to only 4 cents, 6 per cent of the straight time rate. The 1950 fringe costs are far above the previous high of 27 cents in 1944 when overtime and holiday premiums bulked large.

Up and Up—The corporation will start its 51st year of operation on Apr. 1 with the highest annual capacity in history, about 33.9 million tons of ingots. Construction and improvement programs now authorized will add about 2.5 million tons more by the end of 1952. Some of that new capacity will be in operation by Dec. 31, 1951. The expansion program will cost $678 million, of which $307 million will be amortized in five years.

As of now, U. S. Steel is shipping 23 per cent of its production on defense and essential civilian orders. About 60 per cent of that amount will be for defense and 40 per cent for essential civilian programs. Ingot production in 1950 amounted to 31.5 million tons, the highest on record for the company, representing 98.2 percent of U. S. Steel's rated annual capacity at the beginning of 1950.



Wide World

THIRST QUENCHER: This 60-ton impeller will deliver 605,880 gallons of water per minute, enough to supply each person in the United States with a glass every 15 minutes. Made by Pelton Water Wheel Co. in San Francisco, the impeller is being readied for shipment to Grand Coulee, Wash. by special routing. Shown is the suction side which will be installed face down

'Security' Causes Contract Value Blackout

METALWORKING companies looking for subcontracts are finding that one of their best leads has partially dried up. The synopsis of contract award information issued by the Department of Commerce field service no longer includes quantity or dollar value of contracts. Reason: Security.

Would-be subcontractors grumble that deletion of the quantity and dollar value information makes hunting for defense work a more hit-or-miss proposition. One wag predicts that soon the government may announce only that "a certain procurement agency has awarded a contract to an unidentified company to produce things."

Baldwin-Lima-Hamilton Corp. has added a latter order for gun carriage mounts to its previous defense contracts. Philadelphia Ordnance says the carriages will be among the largest motorized mounts ordered for the Army. Company already has a $60 million contract for fabricating and machining General Patton tank hulls at its Eddystone, Pa., plant.

Rheem Mfg. Co. completed negotiations with Army for manufacture of shell components under a $2.5 million contract. Production will start as soon as the company completes its new factory at San Pablo, Calif.

Budd Co., Philadelphia, holds $110 million in contracts, prime and sub.

Under subcontract are parts for jet engines from Studebaker Corp., tank components from Chrysler Corp., cargo bodies from Studebaker and General Motors Corp. and wheels, hubs and drums from Budd's regular automotive customers. In addition, the company has prime contracts for manufacture of ammunition components and Army truck cabs.

Some of the better subcontracting possibilities, selected this week by STEEL, are listed despite the lack of value and quantity information.

PRODUCT	CONTRACTOR
Trailers	Trailmobile Co., Cincinnati, O.
Trailers	Hobbs Mfg. Co., Post Office Box 1568, Ft. Worth, Tex.
Teletype Sets	Teletype Corp., 1400 Wrightwood Ave., Chicago.
Cranes	Bay City Shovel Inc., Bay City, Mich.
	Thew Shovel Co., Lorain, O.
	Harnischfeger Corp., Milwaukee
	Garwood Industries Inc., Wayne, Mich.
	Koehring Co., Milwaukee
	Hyster Co., 2902 N.E. Clackamas St., Portland, Oreg.
Tractors	International Harvester Co., Melrose Park, Ill.
	J. I. Case Co., Racine, Wis.
Trainers, Instrument Flying	Link Aviation Inc., Binghamton, N. Y.
Motor Scooters	Cushman Motor Works Inc., Lincoln, Neb.
Turbosupercharger Regulators	General Electric Co., Schenectady, N. Y.
Manifold Exhaust Assemblies	Solar Aircraft Co., San Diego, Calif.
Fire Control Compressors	Cornelius Co., New Brighton, Minn.
Stake Trucks	Autocar Sales & Service Co., Ardmore, Pa.
Semi-trailers	Highway Trailer Co., Edgerton, Wis.
Tank Trucks	General Motors Truck & Coach Div., Pontiac, Mich.
Station Wagons, 7 passenger	Willys-Overland Motors Inc., Toledo 1, O.

8-Month Defense Tab

Total through February: $27.8 billion. Procurement and construction cost $19.7 billion

A TOTAL of $27.8 billion was obligated by the Department of Defense for the eight months of the fiscal year through February. This figure includes procurement and construction funds as well as military pay and allowances, research and development.

Of this amount approximately $19.7 billion was for procurement alone, including firm contracts, financed portions of accepted letters of intent and other obligations. Hard goods—aircraft, ships, tanks, weapons and ammunition—accounted for $16.3 billion, while clothing, subsistence and petroleum products cost $2.2 billion and military construction and facilities expansion totaled $1.2 billion. The Army spent about $8 billion, the Navy $4 billion and the Air Force $7.7 billion. The year's budget calls for approximately $28.7 billion for procurement and construction alone, leaving about $8.8 billion yet unspent.

The Navy has earmarked about $500 million of this year's funds for procurement and production of new and improved weapons. Emphasis is being placed on air warfare, anti-submarine and air defense weapons. Navy's Bureau of Ordnance is broadening its base of suppliers for its accelerated procurement program.

Pricing Formula Set

Base date is second quarter of 1950. You may add labor and materials costs

THE FORTHCOMING pricing regulation covering manufactured goods is in the final review state. OPS officials hope to issue it in time to become effective Apr. 2.

This is the formula, subject to possible minor changes: Your base price is your maximum price in the second quarter of 1950; to this base add your labor and materials cost increases through Mar. 15, 1951.

Add Them Up—That is your new freeze price, provided it is not more than 5 per cent above the present ceiling price under the OPS general ceiling price regulation, or more than 10 per cent above your maximum price in the second quarter of 1950. If it exceeds in either of those comparisons, then your new freeze price is five per cent above the present ceiling price or ten per cent above your maximum price in the second quarter of 1950, whichever is the higher.

Two alternate methods of figuring increased labor costs are still being studied. One would allow you to add the increase in direct labor costs; the other would allow you to add 85 per cent of increased factory (that is, direct and indirect labor) costs. The final decision on this matter still is in the making.

Limits—Costs increases other than labor and materials may not be added. Thus, increases in the cost of engineering services, administrative expense, and other costs that figure in overhead may not be added. In other words, there may be no increase in the mark-up between cost and selling price that you observed in second quarter of 1950.

Some manufacturers with whom OPS has discussed these orders object to it as embodying an undesirable form of profit control, but OPS officials believe such control is warranted because of the volume of business made possible by the government through the defense production program, and hence, abnormal profits.

CHECKLIST ON CONTROLS

GOVERNMENT control orders are digested or listed each week in this "Checklist on Controls." For complete copies of NPA orders, write to U. S. Commerce Department, Division of Printing Services, attention E. E. Vivian, Room 6225, Commerce Bldg., Washington 25. For ESA orders, write J. L. Miller, Economic Stabilization Agency, Room H367, Temporary E Bldg., Washington 25.

Materials Orders

IRON AND STEEL—Amendment of Mar. 15, 1951, to NPA Order M-1 increases percentages of production steel producers must set aside for filling of defense orders. (For details see STEEL, Mar. 19, p. 39.) Amendment effective Mar. 15, 1951.

COLUMBIUM AND TANTALUM BEARING STEELS — Amendment of Mar. 15, 1951, to NPA Order M-3 limits production, distribution and use of columbium and tantalum bearing steels to DO rated orders and NPA directives. In addition it prohibits the use of columbium bearing steels in any application or process where columbium-tantalum bearing steels may be used as a substitute for columbium bearing steels; forbids the use of either if any other substitute can be used; and restricts the use of columbium and tantalum in steel production. Amendment effective Mar. 15, 1951.

CONSTRUCTION — Amendment of Mar. 20, 1951, to NPA Order M-4 provides for alterations to store-space in department stores, defines hotel, defines construction cost, permits construction of terminal warehouses, and permits construction by or for the National Advisory Committee for Aeronautics.

STEEL DISTRIBUTORS—Amendment of Mar. 15, 1951, to NPA Order M-6 requires steel producers to allot and ship each month not less than 85 per cent to a warehouse's base monthly tonnage of carbon steel, including orders bearing DO ratings which the distributors may have placed in accordance with NPA Order M-6. Base period is Jan. 1, 1950, to Sept. 30, 1950. Admendment effective Mar. 15, 1951.

CADMIUM—Amendment of Mar. 16, 1951, to NPA Order M-19 broadens the permitted uses of cadmium and lists them.

CANS—Amendment of Mar. 16, 1951, to NPA Order M-25 exempts the canning of products for overseas use of the armed services from the specifications and limitations of M-25.

CHEMICALS—M-45, effective Mar. 16, 1951, provides the means by which any chemical may be allocated when need for regulation is demonstrated. It does not in itself place any chemical under allocation.

COLUMBIUM, TANTALUM — M-49 makes columbium and tantalum and their ferroalloys subject to allocation by NPA on and after Apr. 1, 1951. Purchases of less than 10 pounds a month of columbium and tantalum are exempted from the allocation provisions.

Price Regulations

Amendment 6 of General Ceiling Price Regulation allows sellers to offer a commodity or service for future delivery at the ceiling price in effect at the time of delivery or, if a fixed price is specified, at the fixed price or the ceiling price in effect at the time of delivery, whichever is lower. This amendment, effective Mar. 19, 1951, applies only to commodities and services covered by the General Ceiling Price Regulation. Regulations "tailored" for particular industries are being prepared and will permit sellers to deliver commodities or services at ceiling prices different from those established under the GCPR. Amendment 6 was drawn up so that offers and contracts to sell for future delivery will not be impeded while the tailored regulations are under consideration. The amendment does not permit a seller to deliver a commodity or service at a price to be adjusted after delivery.

Supplementary Regulation 13 to General Ceiling Price Regulation permits producers of all grades of coke, coal chemicals and coke oven gas to adjust their ceiling prices to cover the increased delivered costs of raw materials, principally bituminous coal. The supplementary regulation became effective Mar. 16, 1951, and will expire June 30, 1951.

Windows of Washington

By E. C. KREUTZBERG Washington Editor

Far more disturbing than exposes about mink coats is the smear campaign organized labor is sponsoring against Wilson and others in the defense program

OLD HANDS in Washington are not too much disturbed by current headlines about a White House stenographer's new mink coat, free vacation of an RFC official at a swank Florida hotel and so on.

These are but current counterparts of gifts of other days—household refrigerators, television sets, and blooded cattle. And it isn't news when an occasional government official in a position to do favors for certain corporations later turns up on the payroll of one of them. There always is a limited amount of this sort of thing while Washington continues to dole out political and financial pap.

More Alarming Much more disturbing to Washington observers is the gathering campaign to discredit Charles E. Wilson and the other business leaders who, often at considerable personal sacrifice, have come to head up the defense program. A good many columnists and editorial writers have climbed on this band wagon, and the line they are following is set by Robert R. Nathan, a White House economist in the Roosevelt administration and now radio commentator for the CIO. It is to the effect that the defense program is in bad hands, mistakes follow mistakes and the policies are such as to benefit business. The purpose is to get businessmen out of the picture and put labor in the driver's seat.

Source and inspiration of the campaign, of course, is the United Labor Policy Committee—Philip Murray, Walter Reuther, Emil Rieve, L. S. Buckmaster, Jacob Potofsky, William Green, George Meany, George M. Harrison, Daniel W. Tracy, William C. Doherty, Albert J. Hayes, Elmer Walker, George Leighty and A. E. Lyon.

Labor Campaigns Against Wilson

Watch for MRO Order Changes...

An avalanche of complaints from industry over the so-called MRO order has led to a detailed study of this measure by NPA officials. There will be some changes in it without a doubt, notably a revision in the dollar limitation to allow for the factor of inflation.

Complaints are of two kinds—that customers are ordering MRO goods in unprecedented volume and perhaps in greater quantities than they should on the basis of actual requirements, and that primary metals producers, including the steel companies, are not in all cases honoring DO ratings covering raw material needed for manufacture of MRO goods.

More Defense Personnel . . .

How much steel, farm machinery, fertilizer, etc., do the farmers need to maintain agricultural production during this emergency period? This problem has been proving a difficult one for the Department of Agriculture. To help solve it, Secretary Brannan has called in two farmers who also are former officials of the department. They are Alfred R. Barnes, Huron, S. D., and Jonathan Garst, Davies, Calif.

In charge of all matters involving transmission and distribution of gas, Petroleum Administration for Defense, Washington, is Charles Pratt Rather, president, Southern Natural Gas Co., Birmingham, Ala.

Newly appointed materials and equipment consultant, Solid Fuels Administration, Washington, is John L. G. Weysser, Lansford, Pa. He had been manager of the Lehigh Materials Co., Lansford.

Leslie J. Carson has been appointed Chief, Machinery Branch, Industrial Materials and Manufactured Goods Division, Office of Price Stabilization. Mr. Carson is on leave from Link-Belt Co.

NPA Unit Builds Staff . . .

Marshall M. Smith, director of NPA's Machinery Division, is rapidly building a staff of industry-trained men. All can be addressed in care of Mr. Smith, Room 2134 Temporary T Bldg., 14th and Constitution N.W., Washington 25. Latest recruits, with their assignments, their former company connections and their present telephone extensions on STerling 9200, are:

Metalworking Machinery Branch: Assistant Chief (to handle production problems), Thomas Shriver (formerly president, V & O Press Co., Hudson, N. Y.), Ext. 3502

Light Power-Driven Tools Section: Chief (handling all portable tools and all nonportable tools selling at under $500), Herbert A. Newman (former manager, X-Ray Department, George W. Borg Corp., Delevan, Wis.), Ext. 4806

Necessity Certificates Section: Chief, Jay Cresswell (former president, Anker-Holth Mfg. Co., Port Huron, Mich.), Ext. 4855

Foundry Equipment & Supply Section: Aubrey J. Grindle (retired vice president, Whiting Corp., Harvey, Ill.), Exts. 4805 and 4806

Welding Equipment Section: Dale D. Spoor (Air Reduction Co., New York), Ext. 4806

Metal Forming Machinery Section: Chief, Paul Norris (vice president, Dennison Engineering Co., Columbus, O.), Ext. 4807

Industrial Furnaces & Heating Equipment Section: Chief, Carl L. Ipsen (on leave as manager of Industrial Heating Divisions of General Electric Co., Schenectady, N. Y.), Ext. 4805

Construction, Mining, Oil Field & Agricultural Equipment Section: Chief, Neal Higgins (International Harvester Co., Chicago), Ext. 713

Farm Machinery Section: Chief, Robert Terry (government career official) Ext. 2921

Industry men previously announced in STEEL as functioning with the Machinery Division are:

Metalworking Machinery Branch: Chief, Col. P. L. Houser (International Harvester Co., Chicago), Exts. 3463 and 3757

Priorities & Distribution Section: Chief, Paul S. Gaston (machinery distributor), Ext. 3463

Machine Tool Consultants: Payson Blanchard (Bullard Co.), Ext. 3502; Herbert L. Tigges (Baker Bros.), Ext. 3463; Robert M. Husband (Cincinnati Milling Machine), Ext. 3502; Edgar J. Seifreat (Seifreat-Elstad), Ext. 3463; Andrew G. Carey (Carey Machinery), Ext. 3463

Europe's Steel Capacity Increases

Economic Commission for Europe forecasts production potential of 82.5 million net tons of ingot steel by 1953, but warns of overexpansion

EUROPE, excluding the Soviet Union, will have the capacity to produce nearly 82.5 million net tons of ingot steel by 1953. Actual production in 1950 was 66,770,000 tons.

Of that total capacity, 69,520,000 tons will be in Western Europe, predicts the United Nations Economic Commission for Europe. That's 3,740,000 tons more than the group foresaw late in 1949 when it made a similar study. ECE estimates that Eastern Europe's capacity by 1953 will be 12,650,000 tons, 1.1 million more than it forecast in 1949. East Europe's potential doesn't include that for Russia.

Pessimistic—The commission says Europe will produce to capacity in 1953 only if the demand still exists and if adequate supplies of raw materials are available. ECE in 1949 predicted that Europe was overexpanding, and it still thinks so. It sees domestic European steel consumption at 66 million tons by 1953 and exports to underdeveloped areas in the Far East, Near East, Africa and Latin America at 8 million tons, about the 1949 level. It sees no possibility of the remaining 8.5 million tons of the capacity being exported to the U. S. and Canada. Unless there's an allout war, says ECE, the U. S. market for European steel is bound to decline by 1953 as added American capacity comes in. In 1950 the U. S. consumed only about 2 million tons of European steel.

According to the commission calculations, domestic European consumption by 1953 will be nearly 10 million tons more than it was in 1949, but exports to colonial areas will not surpass the 1949 level because of rapid industrial expansion in those regions. ECE is optimistic only about export possibilities to Canada. Increased steel exports to the dominion will probably "continue for some time," it says.

On the Low Side—ECE admits its estimates for domestic consumption are conservative, but other European observers say they are "extremely low." Consensus is that a prediction of domestic use of even 70 million tons by 1953 would be conservative. Most believe that an armament program will still be in full swing two years hence.

Most Europeans think the major limiting factor in steel output by 1953 will be raw materials. Coal and scrap are tight now, and there's little hope of great improvement.

Coal Lack Cuts Ruhr Output

The coal shortage cut Ruhr steel production in February to only 858,000 net tons. Because of the drop, only 63,000 tons of foreign steel orders could be booked in the month.

Scrap is also such a problem that the Bonn government has wangled Allied agreement to limit exports to about 60,000 tons monthly. Bonn has also appointed a special scrap official to direct scrap supplies to key consumers.

The industrial domestic issue in Western Germany is co-determination. Much of the steel and coal industry are already committed by the government to reorganizing their boards of directors to include five members representing workers and five representing owners. The eleventh will either be chosen by the other ten or appointed by the government, an issue yet to be resolved. The unions are pressing for an early adaptation of the coal and steel plan to the chemical industries.

Employers claim that codetermination is strictly an issue fanned by the union leaders and that the rank and file have only passive interest.

The Bonn government has already gone on record that it expects its parliament to approve the Schuman plan signed last week in Paris by representatives of the governments involved.

French Group Builds Mill

The group of French manufacturers that will build the South American steel mill in Colombia is headed by Delattre et Frouard. They will build an electrical power plant, coke ovens, blast furnaces, open-hearth shop, rolling mills and wire and nail plants.

The $25 million plant in the Paz de Rio area will be ready to produce by the end of 1953 at the rate of 100,000 tons a year. Colombia has both iron ore and coal, although coal reserves are inconveniently located in the mountains.

Steel Shortage Worsens in U.K.

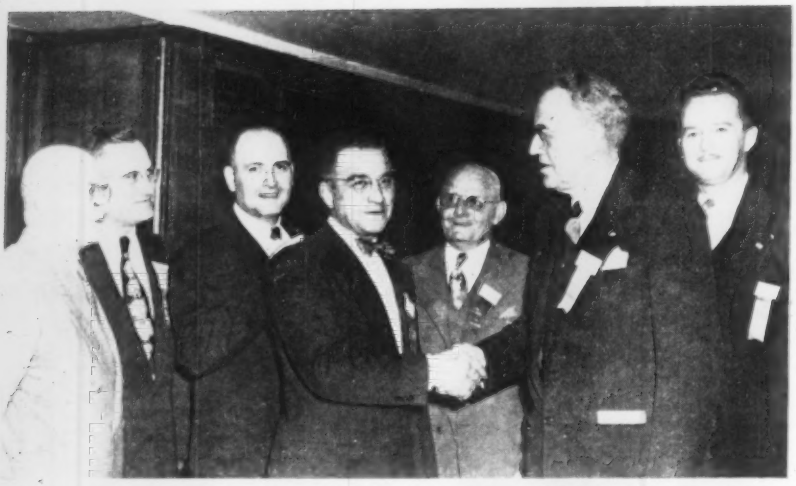
British steel production in February was 18,985,120 net tons, an all-time record for that month.

Despite the good production, the steel shortage is worsening and unemployment is developing among users as they are forced to close down fabricating operations. Hardest hit are automakers and heavy equipment builders. There's little hope of relief for another six months, when the new South Wales plant at Margam will begin operating.

Most steel consumers are booked up almost entirely with civilian business. Some rearmament work has been placed, but the overwhelming majority is still to be awarded.

Wide World

MINING MONSTER: Built for the open lignite mines near Helmstedt, Germany, this new 1100-ton blade-wheel excavator will dig about 850 cubic yards of brown coal per hour. The giant machine, 240 feet long and 105 feet high, is driven by 40 electric motors with a capacity of 1-million watts



HEAD MEN: Retiring president Herbert L. Tigges, right, congratulates J. J. Demuth on the latter's election as 1951-52 president of the American Society of Tool Engineers. Other newly-elected officers, left to right, are: W. A. Thomas, secretary; H. C. McMillen, treasurer; L. B. Bellamy, first vice president; Thomas J. Donovan Jr., third vice president; and, behind Mr. Tigges, Harry B. Osborne Jr., assistant secretary-treasurer

ASTE Pledges 'Know How'

Production planners wire support to Wilson; Stanton calls for worker price aids

Industry's tool engineers pledged Charles E. Wilson, Director of Defense Mobilization, their full support in filling both defense and essential civilian needs "with 100 per cent of production know how."

At the same time, speaker R. F. V. Stanton, vice president of American Machine & Foundry Co., Brooklyn, N. Y., criticized the government for its lack of an effective program to meet the inflation now periling the U. S. worker.

Those, with the election of officers, were highlights of the banquet program winding up the annual American Society of Tool Engineers' convention at the Hotel New Yorker in New York.

One of the evening's plaudits was reserved for Sen. Ralph E. Flanders (Rep., Vt.) who was accorded a lifetime honorary membership in ASTE. Senator Flanders is former president of Jones & Lamson Machine Co. and Bryant Chucking Grinder Co. of Springfield, Vt. In World War II, he was chairman of the machine tool commission of the combined Production and Resources Board and administrator of machine tool priorities.

Power Conference Draws 2500

More than 2500 engineers from the United States and Canada will attend the 13th annual Midwest Power Conference Apr. 4-6 at the Sherman Hotel in Chicago. Sixty papers are on the agenda covering phases of production, transmission and consumption of power, says R. S. Budenholzer, conference director and professor of mechanical engineering at Illinois Institute of Technology.

Electrochemists Name Hunter

New president of the Electrochemical Society Inc. is Dr. Ralph W. Hunter, manager of the electrochemical division, Dow Chemical Co., Midland, Mich. Dr. Hunter succeeds Dr. Charles L. Faust of Battelle Memorial Institute, Columbus, O. The new president will take office during the society's annual convention, Apr. 8-12 at the Wardman Park Hotel, Washington.

Paul L. Howard, National Bureau of Standards and general chairman of the convention, reports technical symposia prepared on these topics: Electric insulation, luminescence, rare metals, electrothermics and electrode kinetics.

Westinghouse Forum Is Apr. 10

Westinghouse Electric Corp.'s Machine Tool Electrification Forum is scheduled this year at the William Penn Hotel, Pittsburgh, Apr. 10-11. Taking places of prominence on the 1951 program are the vital industrial factors of materials allocations and conservation of manpower and equipment, says J. J. Smith Jr. of the Westinghouse Industry Department, general manager of the Forum.

Among the twelve speakers presenting papers, three will deal with topics inspired by the emergency defense effort: "Introduction to Defense," "Conservation of Manpower and Materials" and "Discussion of Priorities and Materials."

Screw Machinists Talk Defense

Theme for the business session of the National Screw Machine Products Association convention will be "Defense Problems Departmentalized." The association meets Apr. 18-21 at the Netherland Plaza Hotel in Cincinnati.

Planned for discussion are these potential trouble spots: Personnel, purchasing, renegotiation and taxation, inspection and engineering difficulties on government orders.

Possibility for American Capital

The Technical Cooperation Administration, the State Department's new creation to administer the Point Four program of rendering technical assistance to foreign countries in need of it, is approaching the point where American industrial experts will be called on to make surveys abroad. Some 100 are slated to go to the Latin American countries alone; they will be taken on as government employees, or they will be borrowed from their employers—and in many cases private firms will be given contracts to make specific surveys.

About 75 per cent of the requests for technical assistance is to develop education, health and agriculture; the other 25 per cent involves proposed programs in power development, communications, mining, manufacturing, and distribution.

The Technical Cooperation Administration hopes to report the foreign needs that spell opportunities for American business and industry. In many of these cases opportunities may be sufficiently attractive to warrant the investment of American private capital to exploit them.

The whole program is under the direction of Dr. Henry Garland Bennett, former president of Oklahoma A & M College.

Hopewell Village Story

Collectors of literature on early ironmaking plants of the United States may obtain from the Superintendent of Documents, Government Printing Office, Washington 25, for 20 cents, copies of a new 44-page handbook entitled "Hopewell Village." It describes the charcoal iron furnace and adjoining facilities at Hopewell, five miles southeast of Birdsboro, Pa.

CMP Policy Tangled as Target Date Nears

NPA is wrestling with the problem of whether to schedule all materials requirements or only those for defense and essential civilian needs

A BASIC issue must still be resolved before the Controlled Materials Plan can go into effect: Should all requirements of any type be programmed, or only those for defense and defense support?

Current thinking favors the latter procedure, which in effect would mean the operation of CMP on an open-end basis. That is, the supply of steel remaining after all defense and essential civilian requirements had been scheduled would be free.

Rush for Remains—Such a system could be bad, say objectors in NPA, because it might precipitate a mad scramble among non-rated consumers for the steel that's left. Majority opinion at this time is that such a scramble and its inflationary effects could be avoided easily by issuing limitation orders. They would allow the filling of all permitted requirements from the supply left after rated programs were scheduled. A decision about that is expected soon.

In the meantime no more directed programs will be set up for allocation among the steel producers. Instead, NPA is allowing use of DO ratings to get material when such action is necessary. The plan calls for continuation through June of the 11 directed programs; allocated orders have been distributed for May shipment. Starting July 1 all directed programs will be under CMP.

Setting the Stage — Undergoing final correction and revision are three thick books on the CMP system. They list A and B products under CMP and products assignments to NPA divisions.

Other loose ends are also being cleaned up. A new Programming Order for steel is being prepared for use in implementing CMP. This will supersede the present Supplements 1, 2, 3 and 4 to Steel Order M-1, which will be canceled upon issuance of the new programming order.

Warehouse Woes—Action is also developing to help maintain adequate stocks of steel in warehouses so that —both for the present time and for the CMP phase starting in July—the warehouses will be reasonably able to take care of normal demands. The order is now in the review stage. It would permit the warehouses to obtain, over and above their present quota, up to 25 per cent additional tonnage to replace steel shipped on DO-rated orders.

Pressure is being renewed by NPA on all claimant agencies to report future defense and defense-support requirements without delay. The important figures of course are those for the defense needs, and up to this time the Munitions Board has been unable to give any accurate forecasts. Now it has promised to submit the data "within a few days."

Heat on Businessmen—A summer sojourn in Washington, and not always in air conditioned buildings, is promised to many more industry men. The call will be for expanding the NPA force to meet manpower requirements of CMP operation and administration. The Iron and Steel division, now numbering 105, will be up to 175 by April and higher later on. At present NPA has 1500 employees in Washington and 550 outside. By July 1, the total in Washington should be around 6000, and that in the field offices at least 2000.

Still stressed by NPA is the need for informed representatives in key locations all over the country so that businessmen can get their questions answered near their homes. The opening of Commerce offices at Norfolk and Roanoke, Va., give NPA representation at 93 places in the country. Several more regional offices are to be opened soon.

Tool Builders Subcontract Less

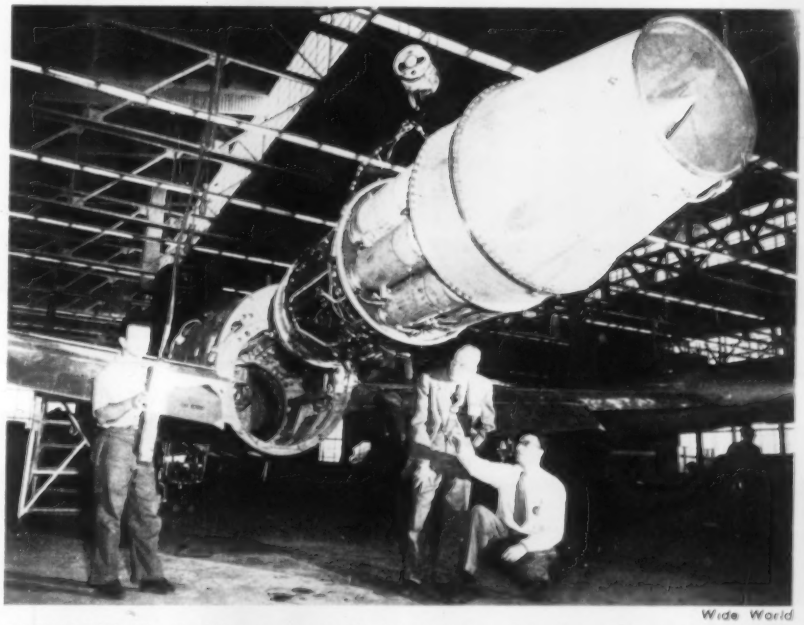
The machine tool price freeze is working hardships not only on the manufacturer but on his subcontractors as well.

With order books overflowing, machine tool builders must subcontract an increasing amount of work. Because of the price freeze the added expense of subcontracting in many cases raises costs close to or above selling prices. Consequently, say toolmakers, unless the government permits selling prices to be based on actual costs, subcontracting will continue to be limited and machine tool output will suffer.

This reasoning is behind some builders' refusal to make firm price quotations on goods delivered in 1952. Brown & Sharpe Mfg. Co., Providence, has joined this group and will not make firm quotes for 1952 deliveries until the government's price order is clarified.

Patents Available

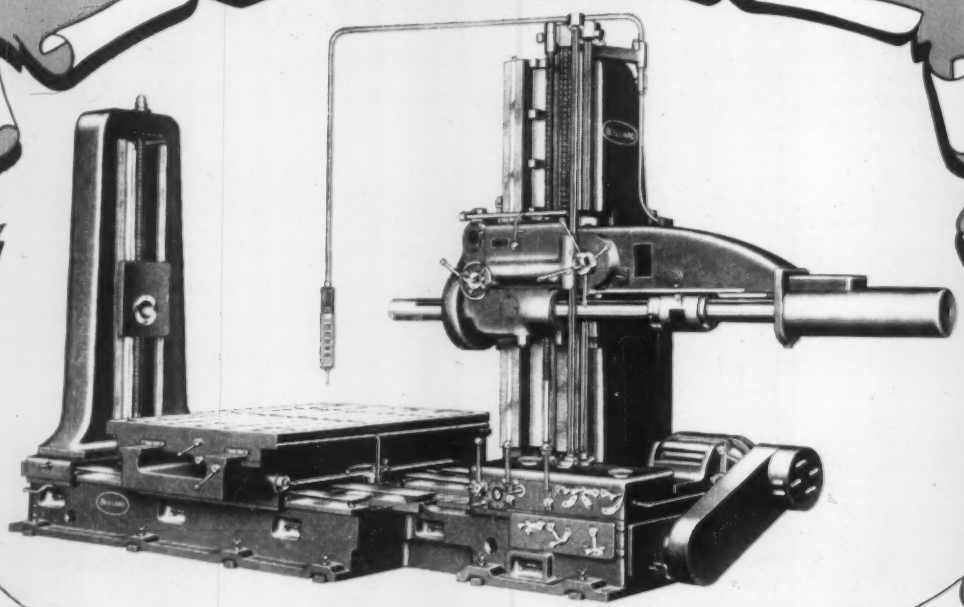
An additional 324 patents are listed in the "Register of Patents Available for Licensing or Sale" by the American Telephone and Telegraph Co.



Wide World

EASY DOES IT: Pushbutton controlled hoist is used to fit a jet engine into an F84E Thunderjet at the Farmingdale, Long Island, plant of Republic Aviation Corp. Pylons, jettison-type carrying devices for fuel tanks and armaments for the F84 will be supplied by Westinghouse Electric Corp. which negotiated the subcontract for its Mansfield, O., plant

NOW — 4 WAY Bed Construction



BULLARD

HORIZONTAL BORING MACHINE

In addition to the Bullard 4-way bed construction, other design improvements such as protected bed-ways, non-metallic bearing surfaces under table and saddle, and adjustable nuts for table and saddle feed screws are a few of the improvements that place these 4" and 5" spindle machines on your list for investigation.

Furthermore, don't forget—convenient right hand operation, safety features and hydrodynamic drive.

Write Bullard for other details

THE BULLARD COMPANY

BRIDGEPORT 2, CONNECTICUT

By H. C. TUTTLE *Detroit Editor, STEEL*

Mirrors of Motordom

The insinuation last year was that the auto industry was getting preferential treatment in getting steel, but production figures this year have amplified complaints to a roar

DETROIT

A RUDE awakening is believed to be in store for metalworking plants that expect their procurement difficulties to end after they weather the rough second quarter. Many companies are pinning their hopes on a controlled materials plan. They think *magically* everything will be all right as of July 1.

But if CMP is to be of the open-end variety, as Washington sources are indicating, the hopes very likely will be dashed to bits. If CMP is to apply only to defense and defense-supporting activities, while the rest of industry is forced to scramble for materials in the same fashion as it has, the headaches of recent months will be compounded. And the psychological let-down will be terrible.

Metals consumers contend the DO-rated order system has become intolerable. Most significant reason they advance for their dislike of the plan is that it gives supplier companies a most convenient excuse for failing to deliver or even accept orders for steel or components. So snarled up are steel mill order books in some cases that nonrated orders have lain around for months before finally being refused. Result is that April promises for many companies are unbelievably small.

Complaints against the auto industry's steel purchasing power are at a peak. Last year the insinuation that they were getting preference was strong, but car production figures so far this year have amplified complaints to a roar. Some steel users say they have been told quite frankly by suppliers their problems are of little concern. One Detroit-area manufacturer who suggested to his steel source that nonrated steel tonnage should be distributed percentagewise on the same basis as before DO tonnages figured in the distribution scheme was told point-blank this would cut down too much on the leading automakers' production schedules.

Only the intercession of the mill's president and the promise of a token steel release headed off a report to NPA on the situation.

The worst bottleneck is in the alloy steels and bar stock. Sheets are reportedly more plentiful. Forging billets are impossible to obtain in adequate quantities, even with price no object. The same is true of nut stock, particularly for heavy-duty applications. A number of companies here anticipate having to curtail or stop operations completely next month unless they can locate more nuts.

And the bolt situation is not much better, some companies fearing slowdowns if they fail to locate stock.

Cry Is On for Boron Steel

The promise of boron-treated steels to replace conventional alloys has potential users pleading: *Where can I get some to experiment with?* Not only are small-tonnage users asking the question—one of the largest producers of gearing and transmission equipment in the area has been unable to obtain a sample. Although testing has been reported (STEEL, Mar. 19, p. 52), fear of the vast majority of potential users is that they will get their first look at the boron steels on the day shipment of their regular grades is cut off.

New Patternmaking Savings

The foundry industry is often accused of being overridden with tradition and skepticism of anything new.

Automakers, though, are doing a job of proving such isn't the case. Being production operators, they can inaugurate systems smaller shops could not duplicate. They can also take a chance on experimenting with new materials that less financially able firms cannot risk. The shell molding process is one such development.

In time it may stand the foundry industry right on its ear.

There are foundry developments with new materials that aren't being kept so secret; patternmaking, for one, has been subjected to the influence of new materials. L. H. Kinney, pattern engineer at Chrysler's central pattern department, describes the success his division has had with patterns made from heat treated copper-silicon bronze. Used for exhaust manifold molds, a three-year-old pattern of the material still shows no signs of wear. Two sets of the patterns have produced in excess of 1.5 million molds, despite the normal abrasive effect of the sand being poured over them.

Illustrating their economy, the only maintenance cost has been $85 for replacement of the steel facing on the strippers. Although they require 25 per cent longer machining time in manufacture, the patterns have proved to be important cost savers over those made of aluminum, brass, iron and steel.

Other cost-saving patterns over the long-run for Chrysler are those cast to size by a secret process in a New York state foundry. This process imparts good as-cast surface finish and requires no machining to size. The process has been used for permanent mold production, but Chrysler's recognition of it as a pattern-making process is entirely new. Because no machining is necessary the surface hardness remains intact and the abrasiveness of sand imparts a glassy finish almost at once. Only drawback is that the dimensions of the prototype pattern, which can be of any material, must be arrived at by the cut-and-try method. Patterns

Auto, Truck Output

U. S. and Canada

	1951	1950
January	661,592	609,878
February	656,238*	505,593
March		610,680
April		585,705
May		732,161
June		897,853
July		746,801
August		842,335
September		760,847
October		796,010
November		633,874
December		671,622

Weekly Estimates

Week Ended	1951	1950
Feb. 24	199,247	125,285
Mar. 3	177,356	124,072
Mar. 10	180,577	124,563
Mar. 17	177,906	134,453
Mar. 24	180,000	140,196

Estimates by Ward's Automotive Reports

* Preliminary.

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cost less than those made oversized and then machined.

Safeguarding by Microfilm

An interesting offshoot of Ford's security program is the provision it is making for safeguarding blueprints and drawings. In the last two years 1,250,000 microfilms have been made of vital designs and engineering drawings. Without these prints the company would find it almost impossible to stay in operation. They include drawings of dies, gages, jigs and fixtures as well as engineering drawings of cars, trucks and engines back to model T Days.

At least 3 million additional microfilms are to be made. When finished the records will contain 2 million engineering prints, 2 million manufacturing engineering prints and 250,000 plant engineering microfilms. So that no harm comes to them the negatives are secreted in storage vaults well removed from the Rouge.

Behind the Scenes at Hudson

Long on inventiveness when it comes to publicity angles, automotive experts can learn a lesson from Hudson's latest release. Hudson takes the public behind the scenes to show how its glamor photographs of cars are made.

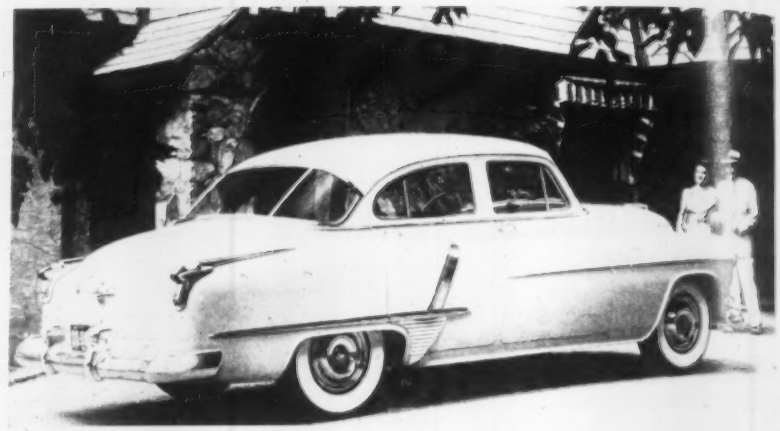
Presenting a picture of a convertible loaded with bathing-suit babes on a beach of snow-white sand, Hudson also shows a rear view of the scene with the car on a wooden superstructure and the sand ending just out of range of the front camera. To rig up the picture, and presumably others like it, the convertible was shipped out of Detroit's snow to Cincinnati, then barged down the Mississippi and trucked to Florida. A regular beach wouldn't do, so the car was taken to Cypress Gardens where a concrete ramp was camouflaged with sand trucked in from Daytona Beach.

Packard Buys More Land

Packards' 1950 annual report contains the clue about where the company's future plant expansion can be expected. When it landed the contract for J-47 turbojet engines (STEEL, Mar. 12, p. 66), President Ferry noted more space might be needed. The report discloses 55½ acres adjoining a proving ground near Utica, Mich., have been purchased and will be "available for construction of manufacturing and test facilities to handle new defense contracts."

Packard came through a nine-month period of red ink to finish the year with a net profit of $5,162,348, equivalent to 34 cents a common share. Car production was 72,138 units, compared with 104,593 in 1949. In that year earnings were $7,706,042, or 51 cents a share.

Profitable operations began in fourth quarter after introduction of new models. Forty per cent of the entire year's car production was in that period and output for the quarter was almost double that for the fourth quarter of 1949.



RAKISH ROCKET: Displaying new charms is the 1951 Oldsmobile Super "88" sedan. The wrap-around rear window contains over 50 per cent greater area than previous models. Rear emblem serves as deck lid handle, and bullet-shaped tail lights enhance smooth body lines. Bright wide sash on the rear door is an "88" innovation

Willys Lands Defense Contract

Willys-Overland, which hasn't had too much to do in the defense program—except for its military jeeps—booked a large order for jet engine components. Officials are not discussing the exact size, but indicate it is in excess of their $63 million jeep contract. A letter of intent from the Air Force for components for the J-47 engine gave Willys the go-ahead on the purchase of the Anderson, Ind., plant which Chevrolet used in the last war for production of aluminum aircraft parts.

A $7 million tooling project was begun immediately at the plant. Its 226,000 square feet of floor space will be used for forging, welding and machining operations. About 1200 employees will be required.

Super 88 Arrives—Again

The long-awaited Oldsmobile Super 88 made its appearance last week after a false start and some early showings in scattered locations. Price-tagged between the 88, which remains in production and the 98, the model has the Fisher O-B body used on the Buick Special. Little similarity exists between the two car makes because of the unusual application by Olds of bright trim diagonally forward from the gravel shield on the rear fender to the shoulder of the fender, apparently a design touch calculated to emulate Cadillac.

The body is wider and roomier overall than the previous 88 design. Many other features of the larger 98 are incorporated in the 88. The sectionalized full rear window is one. Another is the use of leaf-type 58-inch springs in the rear and a six-point suspension system. Wheelbase of the Super 88 is 120 inches; length 204 inches.

Wraps Off Allison Jet

Allison Division of General Motors has taken a few wraps off its superpowered J35-A23. This engine develops greater thrust, the company says, than any jet engine heretofore produced. How much power it has is not being told; the guess is in excess of 10,000 pounds thrust or more than 20,000 horsepower. E. B. Newill, Allison general manager, predicts the annual expenditure by the government on jet engines with GM will run to $1.5 billion. It is that engine for which Chevrolet is tooling a Tonawanda, N. Y., plant.

The Allison engine is claimed noteworthy for its fuel economy. It has 16 axial stages of compression and a three-stage turbine, measures 172 inches long and 37 inches in diameter.

Four of them will be used to power the XB-47-C bomber when it takes its trial flights this fall. This is two less engines than are being used on the B-47-B and because of the weight saving and reduced fuel requirements the new design is expected to have a substantially greater range.

The Business Trend

Scattered labor troubles affecting steel and automobile output cause slight decline in industrial production index but it's still much higher than it was a year ago

LABOR difficulties took some of the zip out of industrial activity and caused STEEL's industrial production index to ease off in the week ended Mar. 17 to 220 per cent of the 1936-1939 average. In the preceding week the index registered 221.

The work stoppages were in the steel and automobile industries.

Even with these interferences the industrial production index is only 5 points below the postwar record set in the week ended Feb. 24. Compared with the 187 registered a year ago, the current level is stratospheric. Only twice this year has the index been below the 200-mark.

Victim: Steel Output . . .

The labor trouble in the steel industry was among railroad employees at a Pittsburgh mill. Largely as a result of this work stoppage the nation's output of steel for ingots and castings in the week ended Mar. 17 slipped off to 2,001,000 net tons. An improvement was expected for the week ended Mar. 24, the scheduled output totaling 2,021,000 tons, the American Iron & Steel Institute said.

Autos Slow Down . . .

Scattered labor problems in the auto industry and its suppliers dropped the output of passenger cars and trucks to 177,906 units in the week ended Mar. 17, says *Ward's Automotive Reports*. Production in the preceding week was 180,577 passenger cars and trucks. In the week ended Mar. 18, 1950, only 134,453 cars and trucks were produced.

Production thus far this year is approximately 19 per cent better than in the corresponding period of last year. When final totals for March are in it is likely that output for the first quarter will be not far below the 2-million mark, compared with approximately 1,726,000 in the first quarter of last year. Output in the early part of last year was held down by a strike against one of the large producers.

Coal Output Declines . . .

Bituminous coal production dropped off in the week ended Mar. 10 to an estimated 10 million net tons, lowest level since the week ended Feb. 10, but that is not alarming. Stocks of coal above ground are the highest since mid-1949. Output in the week ended Mar. 3 was 11,120,000 tons.

New Plants in Demand . . .

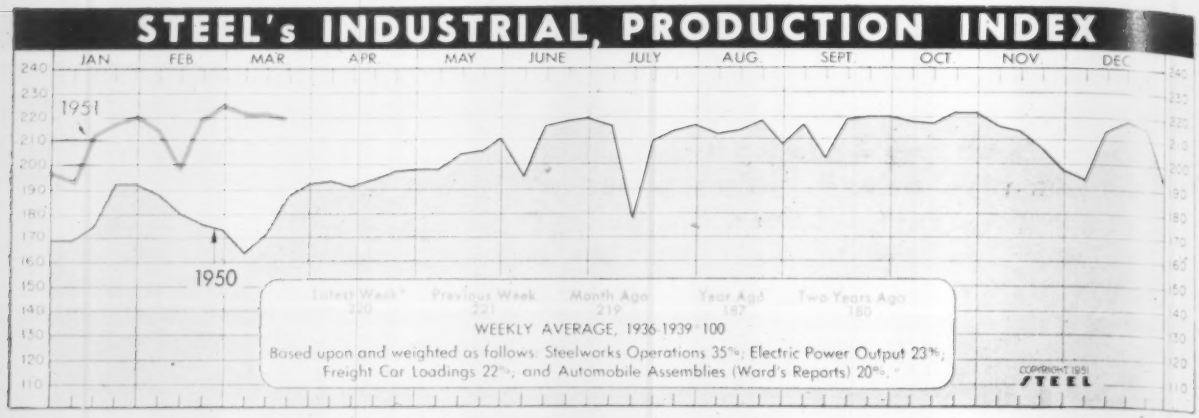
Industrial buildings continue to be the biggest factor in the weekly awards of contracts for heavy construction. They accounted for $54.3 million of the $220.9 million worth of contracts awarded in the week ended Mar. 15, reports *Engineering News-Record*.

Store Sales Settle Down . . .

Department store sales continue ahead of those of this time last year, but Easter buying was said to be the major factor for their doing so. Hard goods and home furnishings

BAROMETERS of BUSINESS

		LATEST PERIOD*	PRIOR WEEK	MONTH AGO	YEAR AGO
INDUSTRY	Steel Ingot Output (per cent of capacity)†	99.5	101.0	99.0	90.0
	Electric Power Distributed (million kilowatt hours)	6,903	6,795	6,905	6,015
	Bituminous Coal Production (daily av.—1000 tons)	1,667	1,853	1,408	2,247
	Petroleum Production (daily av.—1000 bbl)	6,043	6,047	5,937	4,844
	Construction Volume (ENR—Unit $1,000,000)	$220.9	$258.9	$256.5	$213.2
	Automobile and Truck Output (Ward's—number units)	177,906	180,577	177,932	134,453
	*Dates on request. †Weekly capacities, net tons: 1951, 1,999,635; 1st half 1950, 1,906,268; 2nd half 1950, 1,928,721.				
TRADE	Freight Car Loadings (unit—1000 cars)	745†	750	741	726
	Business Failures (Dun & Bradstreet, number)	185	153	165	208
	Currency in Circulation (in millions of dollars)‡	$27,167	$27,219	$27,159	$27,023
	Department Store Sales (changes from like wk. a yr. ago)‡	+20%	+18%	+15%	−1%
	†Preliminary. ‡Federal Reserve Board.				
FINANCE	Bank Clearings (Dun & Bradstreet—millions)	$17,180	$17,202	$13,338	$13,115
	Federal Gross Debt, (billions)	$255.2	$255.7	$256.0	$255.9
	Bond Volume, NYSE (millions)	$23.3	$20.1	$18.4	$23.0
	Stocks Sales, NYSE (thousands of shares)	10,436	8,567	8,836	8,295
	Loans and Investments (billions)†	$69.3	$69.5	$69.2	$66.3
	United States Gov't. Obligations Held (millions)†	$30,658	$30,791	$31,093	$36,463
	†Member banks, Federal Reserve System.				
PRICES	STEEL'S Weighted Finished Steel Price Index††	171.92	171.92	171.92	156.13
	STEEL'S Nonferrous Metal Price Index‡	239.2	248.4	262.3	157.1
	All Commodities†	183.4	183.5	183.4	152.6
	Metals and Metal Products†	189.3	190.7	188.7	168.3
	†Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100. ††1935-1939=100.				



* Week ended Mar. 17

are no longer selling at peak levels; they're down to normal. "Sales," say department store officials, "aren't self-starting any more; it's taking hard promotion to keep the levels up."

Price Index Rests a While . . .

After setting a new alltime record in the week ended Mar. 6, the government's wholesale price index eased off in the week ended Mar. 13 to 183.4 per cent of the 1926 average. The record was 183.5 per cent. The decline resulted from decreases on foods, metals and metal products and chemicals and allied products.

The index is 1.9 per cent above Jan. 23, 1951, 16.9 per cent above the May 24-June 25, 1950, period, and 20.2 per cent above a year ago.

Strike Cuts FRB Index . . .

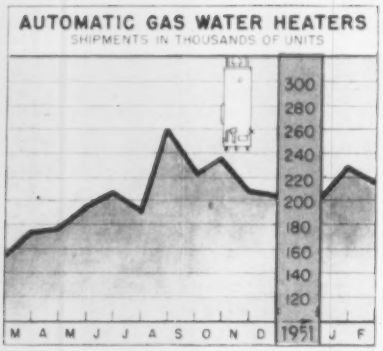
The Federal Reserve Board's industrial production index eased off in February to 218 per cent of the 1935-1939 average. January's level was 219.

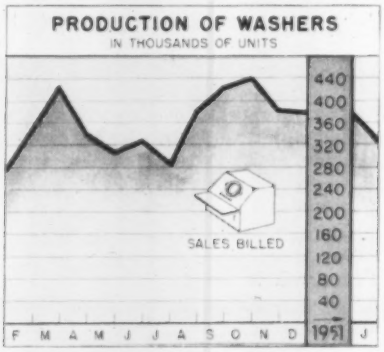
Even after the decline the index is higher than in any month of last year. Highest monthly level in 1950 was 217 in December. The February decline was the result mainly of the railroad switchmen's strike.

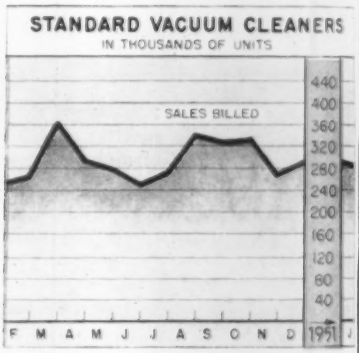
New High for Payrolls . . .

A new high was hit by the iron and steel industry's payroll in January. It soared to $245,294,000, the American Iron & Steel Institute reports. That was an increase of nearly $10 million over the December total despite the fact employment was about the same as in December. Higher wage rates went into effect in December.

Hourly payments to wage earners averaged $1.933 in January, 21.3







Automatic Gas Water Heaters

Shipments in Units

	1951	1950	1949
Jan.	228,100	131,600	88,400
Feb.	215,000	136,500	84,500
Mar.	.....	172,800	106,000
Apr.	.....	176,400	115,200
May	.....	195,200	120,200
June	.....	207,100	132,200
July	.....	197,500	114,400
Aug.	.....	259,800	138,800
Sept.	.....	222,600	147,300
Oct.	.....	235,100	154,200
Nov.	.....	206,000	138,300
Dec.	.....	202,500	126,500
Total	.....	2,363,100	1,466,000

Gas Appliance Mfrs. Assoc.

Household Washers

Sales Billed—Units

	1951	1950	1949
Jan.	321,092	275,576	172,400
Feb.	.....	342,967	201,300
Mar.	.....	423,802	242,500
Apr.	.....	333,072	192,500
May	.....	304,640	211,700
June	.....	325,217	260,700
July	.....	282,261	200,900
Aug.	.....	381,452	323,789
Sept.	.....	424,043	357,281
Oct.	.....	439,924	333,728
Nov.	.....	379,964	298,717
Dec.	.....	377,013	237,591
Totals	.....	4,289,931	3,033,106

American Home Laundry Mfrs. Assoc.

Standard Vacuum Cleaners

Sales Billed—Units

	1951	1950	1949
Jan.	282,305	249,150	228,769
Feb.	.....	263,515	241,267
Mar.	.....	361,014	309,597
Apr.	.....	292,664	252,656
May	.....	278,645	222,856
June	.....	250,190	207,354
July	.....	279,967	161,920
Aug.	.....	341,232	219,909
Sept.	.....	327,524	250,036
Oct.	.....	331,445	272,520
Nov.	.....	265,310	253,516
Dec.	.....	288,756	265,513
Total	.....	3,529,412	2,886,513

Charts—Copyright 1951, STEEL

cents higher than a year earlier. The January average was 2.7 cents less than the December average which had been raised by year-end adjustments in addition to the new wage contract which the steelworkers received.

Average weekly hours of wage earners in the iron and steel industry in January reached the highest level since 1945. The January average of 41.6 hours was 3.1 hours higher than a year ago and 2.7 hours higher than in December.

Employment in the iron and steel industry was estimated at 657,200, practically unchanged from December but nearly 48,000 higher than a year earlier.

Business Hits a Vacuum . . .

Effects of government limitations on the use of metals and materials are beginning to show up in factory sales of standard-size household vacuum cleaners, the Vacuum Cleaner Manufacturers' Association reports. Monthly average of sales in the first two months of 1951 declined 3.5 per cent from the average for the fourth quarter of 1950.

In February, 287,177 units were sold; in January, 282,305.

Heat Is Off Sales . . .

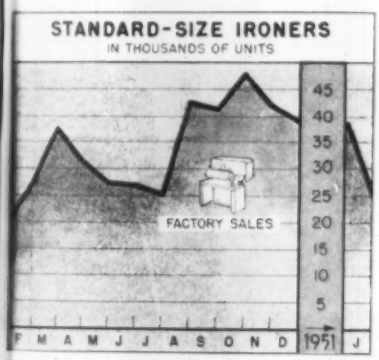
Also down from fourth quarter averages are manufacturers' shipments of domestic gas ranges and gas-fired central heating equipment. Gas range shipments in February were 249,700 units and in January, 225,100, the Gas Appliance Manufacturers Association reports. Shipments of gas-fired central heating equipment totaled 55,100 units in February, 52,900 in January.

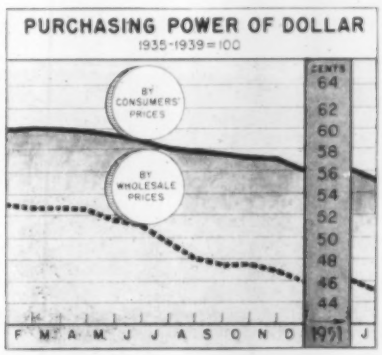
Trends Fore and Aft . . .

Twin Coach Co., Kent, O., expects its sales in 1951 to reach a new peak of $50 million to $55 million. Previous record was $35 million in 1947 . . . Sales of Cory Corp., Chicago appliance maker, in January and February were 143 per cent greater than those in the corresponding period of 1950.

Issue Dates of Other FACTS and FIGURES Published by STEEL:

Construction	Mar.12	Gear Sales	Mar.19	Radio, TV	Feb.26
Durable Goods	Feb.12	Gray Iron Castings	Mar.5	Ranges, Elec.	Mar.12
Employ., Steel	Mar.5	Indus. Production	Mar.19	Ranges, Gas	Mar.5
Fab. Struc. Steel	Mar.19	Machine Tools	Mar.19	Refrigerators	Mar.12
Foundry Equip.	Mar.5	Malleable Cast.	Mar.12	Steel Castings	Feb.26
Freight Cars	Feb.26	Metalwkg. Employ.	Feb.19	Steel Forgings	Feb.26
Furnaces, Indus.	Feb.26	Price Indexes	Feb.19	Steel Shipments	Mar.5
Furnaces, W. Air	Jan.22	Pumps, New Orders	Mar.19	Wages, Metalwkg.	Mar.12





Standard-Size Ironers

Factory Sales—Units

	1951	1950	1949
Jan.	24,600	20,300	28,300
Feb.	...	27,600	28,400
Mar.	...	37,800	23,800
Apr.	...	31,600	18,100
May	...	27,400	19,500
June	...	27,100	21,100
July	...	25,100	17,700
Aug.	...	42,700	32,300
Sept.	...	41,400	27,700
Oct.	...	47,500	36,045
Nov.	...	41,900	35,000
Dec.	...	38,800	19,400
Total	...	409,200	307,345

American Home Laundry Mfrs. Assoc.

Purchasing Power of the Dollar

Cents, as measured by:

	Wholesale Prices		Consumers' Prices	
	1951	1950	1951	1950
Jan.	44.8	53.1	55.1	59.9
Feb.	...	52.7	...	60.1
Mar.	...	52.7	...	59.9
Apr.	...	52.6	...	59.8
May	...	51.6	...	59.3
June	...	51.2	...	58.8
July	...	49.4	...	58.0
Aug.	...	48.3	...	57.8
Sept.	...	47.5	...	57.5
Oct.	...	47.6	...	57.2
Nov.	...	46.8	...	56.9
Dec.	...	45.8	...	56.1

U. S. Office of Business Economics

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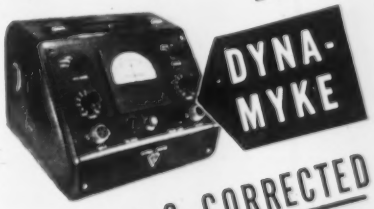

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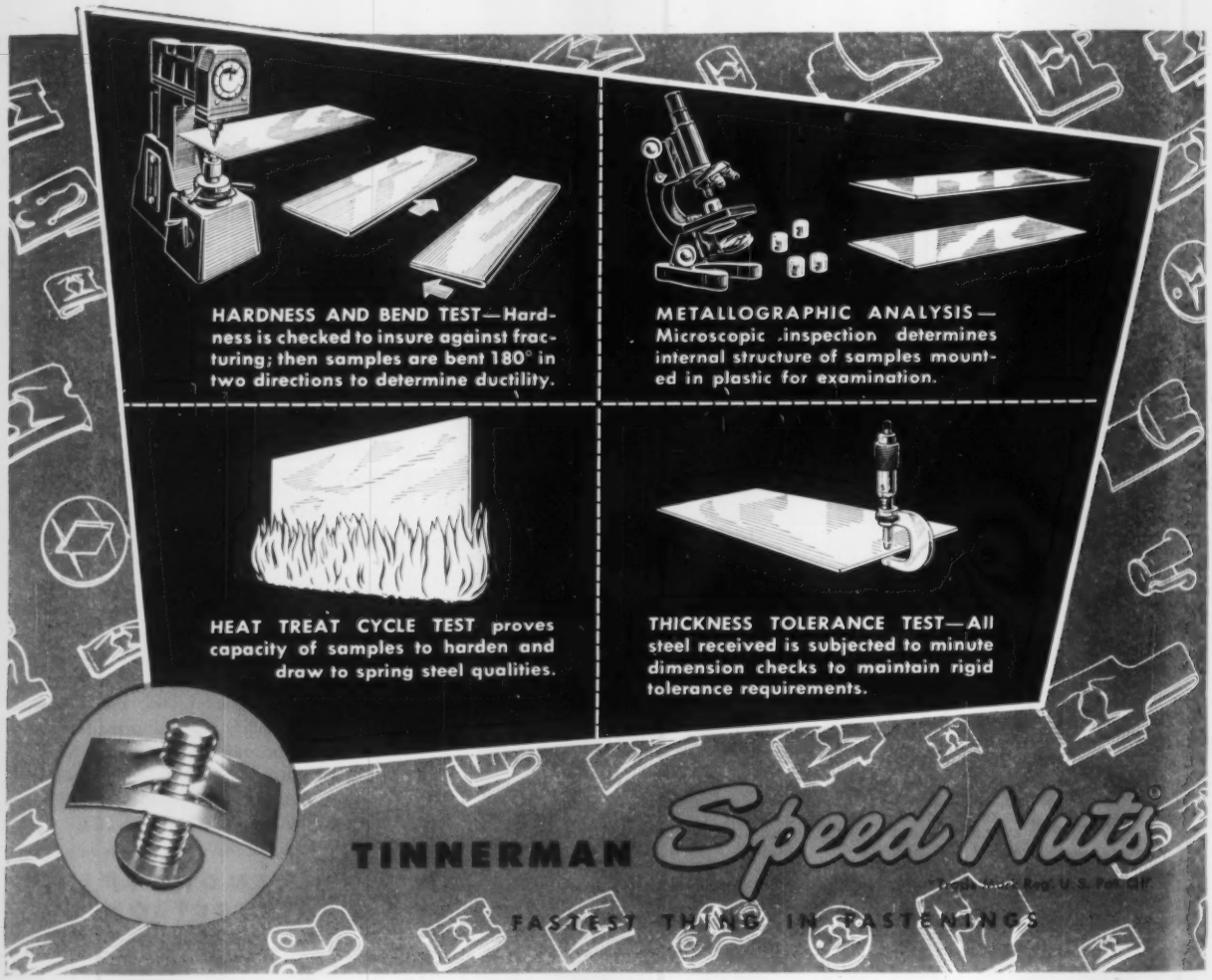
HARDNESS AND BEND TEST—Hardness is checked to insure against fracturing; then samples are bent 180° in two directions to determine ductility.
METALLOGRAPHIC ANALYSIS—Microscopic inspection determines internal structure of samples mounted in plastic for examination.
HEAT TREAT CYCLE TEST proves capacity of samples to harden and draw to spring steel qualities.
THICKNESS TOLERANCE TEST—All steel received is subjected to minute dimension checks to maintain rigid tolerance requirements.
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Men of Industry

ROBERT J. STODDARD
. . . American Hoist V. P.-engineering

WILLIAM R. DIXON
. . . sales asst. at Dow Chemical

DONALD M. LAFLIN
. . . heads sales at Giddings & Lewis

American Hoist & Derrick Co., St. Paul, elected **Robert J. Stoddard** vice president of engineering. A member of the board of directors since 1950, Mr. Stoddard has been chief engineer since 1947.

Raymond H. Schaefer was elected a vice president of **American Brake Shoe Co.**, New York. He joined the company in 1940, became chief metallurgist in 1945 and two years later was appointed director of research and development. He continues in charge of the company's research activities.

Opal Kane, formerly general superintendent, was appointed manager, mining division, **Armco Steel Corp.**, Middletown, O. **J. S. Chapman** was made assistant to manager and continues in charge of personal relations at the division.

Raymond T. Whitzel was named assistant manager of **Aluminum Co. of America's** reduction division with headquarters in Pittsburgh. **John H. DeKlyn** becomes manager of Alcoa's Massena, N. Y., operations, succeeding Mr. Whitzel.

Brainard Steel Co., Warren, O., subsidiary of Sharon Steel Corp., appointed **Richard K. McCreery** as general sales manager. Mr. McCreery joins Brainard after affiliation with Munising Wood Products Co. as sales manager.

Frank U. Naughton Jr. succeeds the late **W. L. Iliff** as manager, eastern sales division, **Hyatt Bearings Division**, General Motors Corp., Harrison, N. J.

William R. Dixon was named assistant general sales manager, **Dow Chemical Co.**, Midland, Mich. He succeeds **Dr. L. S. Roehm** who has accepted an executive position with A. E. Staley Mfg. Co. Mr. Dixon has been assistant manager, plastics sales division, and is succeeded by **Deane R. Ebey.**

Gordon F. Colson was appointed field engineer for the abrasive division of **Norton Co.**, Worcester, Mass. He will be located in the Chicago area.

Graham B. Brown was appointed administrative assistant by **Tube Reducing Corp.**, Wallington, N. J. He left the position of chief of the Iron & Steel Division, Munitions Board, Department of Defense, to join Tube Reducing, and prior to that was with Youngstown Sheet & Tube Co. where he served as assistant superintendent in charge of seamless tube hot mills.

John H. Scott was named assistant chief chemist, **Lukens Steel Co.**, Coatesville, Pa.

Charles A. Marshall was elected president and treasurer of **Newhall-Marshall-Wood Inc.**, New York, following acquisition by him of the stock of his former associates in the corporation. The corporation accepted resignations of the former officers, **David Newhall**, president, and **John S. Wood**, vice president and secretary-treasurer.

Harvey E. Witwer was appointed general factory superintendent, **Geuder, Paeschke & Frey Co.**, Milwaukee. **Jack N. Palmer** was named head of the newly formed defense division.

Donald M. Laflin was appointed general sales manager, **Giddings & Lewis Machine Tool Co.**, Fond du Lac, Wis. He joined the company as eastern district sales manager in 1934, and thereafter held a number of positions in the company's sales department. During World War II he was assistant chief of the tools division, WPB.

Edwin Vereeke was appointed sales manager, **Heil Process Equipment Corp.**, Cleveland. **Robert Peters** was appointed sales engineer for the area west of Cleveland, and **Ken Grader** as sales engineer for the area east of Cleveland.

A. J. Gailey, chief chemical engineer, Electro Metallurgical Co., Niagara Falls, N. Y., was transferred to the research laboratories of **Linde Air Products Co.**, Tonawanda, N. Y., where he will devote his time to chemical processing of metals.

Alfred Fleissig was promoted to director of purchases and contracting for **Hydropress Inc.**, New York, and its subsidiaries.

Paul B. Baird was named manager of standard pipe sales for **Youngstown Sheet & Tube Co.**, Youngstown, succeeding the late **Glenn W. Christopher. Carl T. Selander** was named assistant manager, with headquarters in Chicago.

York Corp., York, Pa., appointed **Rodney F. Lauer** vice president in charge of engineering and research.

Worthington Pump & Machinery Corp., Harrison, N. J., appointed **F. C. Winter** manager of defense procure-

ment, and **C. W. Camp** as assistant.

D. S. Smith was elected president and

D. S. SMITH
. . . Perfection Stove pres., chairman

chairman of the board of directors, **Perfection Stove Co.**, Cleveland. He joined the company in 1910 when it was then known as Cleveland Foundry Co. He held the positions of vice president and treasurer in 1949 and executive vice president and treasurer the following year. **George McCuskey** was elected secretary and treasurer.

Robert C. Allen was appointed treasurer, and **Alan R. Burman** as vice president of **Cro-Plate Co. Inc.**, Hartford, Conn.

Edward Burke was appointed district representative for **Hansen Mfg. Co.**, Cleveland, and will be located in San Francisco where the Burke company is exclusive distributor in northern California for Hansen quick-connective couplings used in pneumatic and hydraulic service.

Vincent D. Bates has resigned as assistant purchasing agent, American-LaFrance - Foamite Corp., Elmira, N. Y., to accept an executive position with **Overdorfer Foundries Inc.**, Syracuse, N. Y.

Industrial managers assigned by Minneapolis-Honeywell Regulator Co. to the field staff of its **Brown Instrument Division**, Philadelphia, include: **Joseph H. Matulis**, named industrial manager, Chicago branch; **Willard Smith**, Pittsburgh branch; and **Joseph H. Bowman**, Buffalo office.

W. B. Strathdee is manager, marine and industrial departments, and **H. R. Benson**, manager, transportation department, New England district, **Westinghouse Electric Corp.**, Boston. **Harry D. Hanafus** is purchasing agent of the recently-formed electronic tube division, and will have headquarters in Bloomfield, N. J. **H. F. Blythe** is manager of accounting for the tube division.

Seymour Preston, formerly in the sales department of International Nickel Co., is now associated with **Alexander Saunders & Co.**, New York, as representative in sales of equipment and supplies for the industrial precision casting process.

Dr. Thonet C. Dauphine was appointed manager, sales development, **Hooker Electrochemical Co.**, Niagara Falls, N. Y. He was eastern manager of product development for Oronite Chemical Co.

C. Keith Ferguson succeeds **Edward D. Quirke**, retired, as advertising manager, **Kewanee Boiler Corp.**, Kewanee, Ill.

Melvin E. Kramer was appointed manager, Cleveland plant, **Reliance Steel Division**, Detroit Steel Corp. He succeeds the late **M. H. Moss.**

Officers of **Kropp Forge Ordnance Co.**, newly formed subsidiary of Kropp Forge Co., which was organized to operate the forge plant at Melvindale, Mich., acquired from Ordnance Tank Automotive Center of Detroit, include: **Roy A. Kropp**, chairman; **Raymond B. Kropp**, president; **Clifford C. Foster**, vice president-manufacturing; **Leo T. Norville**, secretary; **Delmar Woodhouse**, treasurer; and **Kenneth Clark**, vice president.

Sidney J. Sabourin was appointed plant manager, and **Bart Cotter** was appointed chief engineer of the **Fisher Body** Grand Blanc, Mich., tank plant, General Motors Corp. Mr. Sabourin, who has been resident plant manager of the Hamilton, O., Fisher Body plant since 1947, served at the Grand Blanc tank plant during World War II. Mr. Cotter transfers to Grand Blanc from his position as an assistant chief engineer, central engineering division, Detroit.

Speer Carbon Co., St. Marys, Pa., appointed **William E. Harvey** vice president in charge of production of its carbon and graphite products.

Robert R. Nadal, director of Ford **Motor Co.'s** dealer development office, Dearborn, Mich., was appointed general sales assistant to **Walker A. Williams**, vice president-sales and advertising.

Don W. Blend, plant manager, Wolverine Tube Division, Calumet & Hecla Consolidated Copper Corp., Decatur, Ala., and **Glen D. Liddell**, president, Liddell Power Co., Camden, Ala., were elected to the board of **Associated Industries of Alabama.**

L. E. Loshbough was elected president, **Federal Press Co.**, Elkhart, Ind. He succeeds his father, **J. E. Loshbough**, founder of the business, who asked to be relieved of the responsibilities of president in order to become vice president and secretary.

Stanley E. Bovim was named manager of a new branch office of **Allis-Chalmers Mfg. Co.'s** general machinery division in Peoria, Ill. **F. D. McGuire Jr.** was transferred from the Chicago district office to the new Peoria branch as sales representative.

Brooks Chemicals Inc., Cleveland, appointed **George B. Isett** as sales and service engineer in the Chicago district.

Herbert J. Allemang was appointed

SIDNEY J. SABOURIN
. . . tank plant mgr. for Fisher Body

BART COTTER
. . . Fisher Body chief eng.-tanks

J. S. SMITH

. . . directs purchases at Wagner Electric

DELPHINE S. BYRNE

. . . Harper's adv. and sales promotion mgr.

R. F. MERWIN

. . . Eriez president and gen. mgr.

vice president, executive staff, **Philco Corp.**, Philadelphia.

Wagner Electric Corp., St. Louis, appointed **J. S. Smith** director of purchases. He served since 1942 as manager, industrial sales department.

C. W. Frederick, who did product engineering for Chevrolet in World War II, was appointed chief aviation engineer of the **Chevrolet Aviation Engine Division,** General Motors Corp., with headquarters at Chevrolet's Tonawanda, N. Y., plant.

William J. Ross was elected chairman of the board of **Hyman-Michaels Co.**, Chicago. Associated with the company since 1905, Mr. Ross was executive vice president.

Everett A. Utecht was appointed assistant chief engineer, **Davey Compressor Co.**, Kent, O. He has been a member of the Davey engineering staff for the last five years.

Delphine S. Byrne was appointed advertising and sales promotion manager, **H. M. Harper Co.**, Morton Grove, Ill., manufacturer of nonferrous and stainless steel fastenings.

Neal J. Crain was appointed director of purchases, **United Engineering & Foundry Co.**, Pittsburgh. **John C. Utzig** becomes purchasing agent.

John J. Murphy was appointed in charge of the Washington office of **Hudson Motor Car Co.'s** contracts department. He was international representative, Avco Mfg. Corp.

John R. Fennie was appointed manager of the tubular products department of **Joseph T. Ryerson & Son Inc.**, Los Angeles. He became a member of the sales staff of the Ryerson Los Angeles plant in 1946 after two years as assistant superintendent of open hearth, Kaiser Steel Co. He was also connected with Bethlehem Steel Co. at Lackawanna, N. Y., for 15 years.

R. F. Merwin succeeds **O. F. Merwin** as president and general manager, **Eriez Mfg. Co.**, Erie, Pa. O. F. Merwin, who founded the company in 1942, was elected chairman of the board of directors.

Johns-Manville Corp., New York, appointed **W. R. Wilkinson** vice president-sales, and **K. W. Huffine,** vice president-production.

Aro Equipment Corp., Bryan, O., increased the membership of its board of directors from seven to nine members with addition of **R. W. Morrison** and **J. P. Johnson.** Mr. Morrison joined the company in 1940, became general sales manager of all divisions in 1948 and the following year was elected vice president. Mr. Johnson previously served on Aro's board from 1939 to 1947 when he was also vice president and general manager of Aro's Cleveland division. He recently returned as vice president in charge of the re-established Cleveland manufacturing branch.

OBITUARIES . . .

Charles L. Huston, 94, pioneer steel maker and first vice president of **Lukens Steel Co.**, Coatesville, Pa., died Mar. 14. He celebrated his 75th anniversary with the company in December.

John W. Humphrey, 52, general superintendent of the Youngstown district plant of **United States Steel Co.**, died Mar. 17.

Fred H. Johnston, 73, vice president and director, **Goodman Mfg. Co.**, Chicago, died Mar. 19 in Pompano Beach, Fla.

Joseph E. Fields, 72, a director of **Chrysler Corp.**, Detroit, died Mar. 12. Mr. Fields entered the auto industry 43 years ago. He was vice president of Chrysler from its inception in 1925 until his retirement in 1943. He was first president of the corporation's De Soto division, and directed the Chrysler division for six years.

Walter W. Watson, 67, manager of contracts for **Bethlehem Steel Co.'s** shipbuilding division, Quincy, Mass., died Mar. 12.

Otto Steingraber, 53, a vice president of **Frisby Tool & Die Co.**, Detroit, died Mar. 11.

Edwin S. Carman, founder and chairman of **Edwin S. Carman Inc.**, Cleveland, died Mar. 20. He was president of the company for 20 years.

Bertram R. Secord, 66, industrial and labor relations adviser at the **Hudson Motor Car Co.**, Detroit, died Mar. 11.

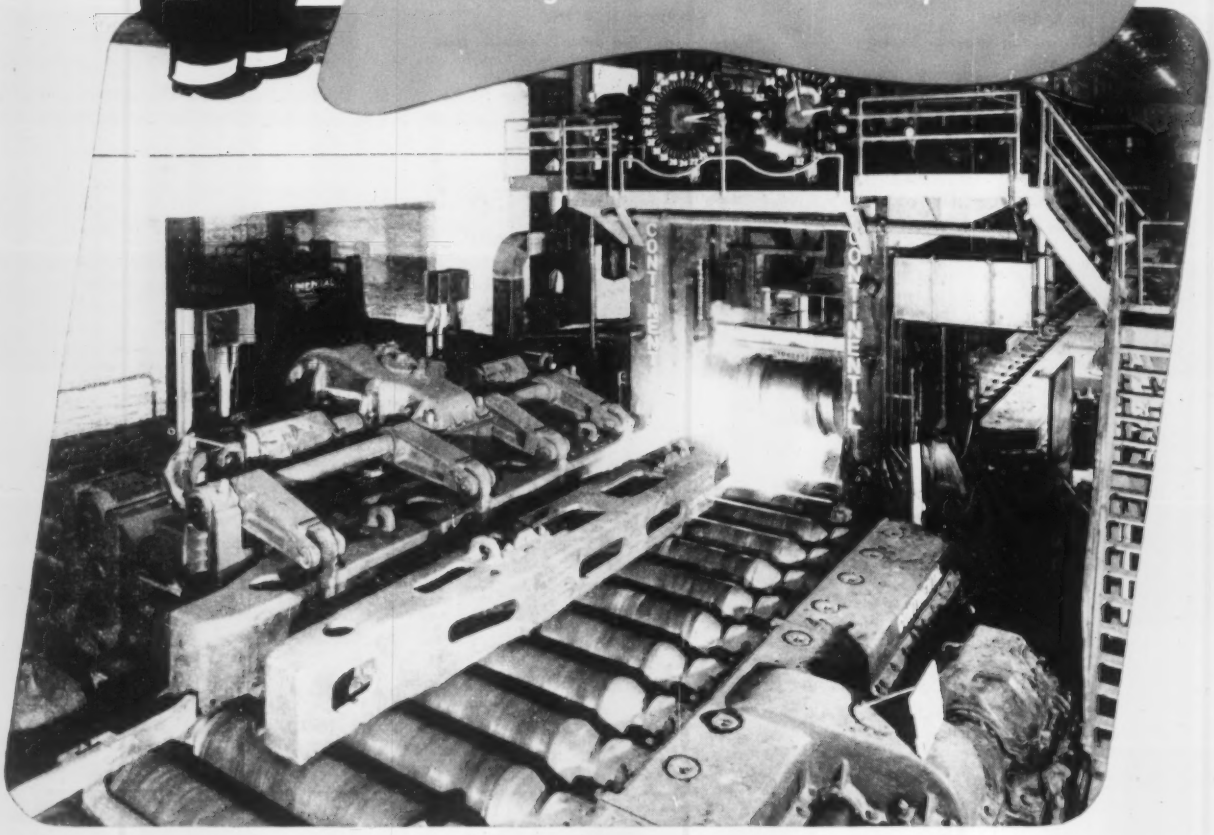
William Watson Sr., 82, former vice president in charge of manufacturing, **Allis-Chalmers Mfg. Co.**, Milwaukee, died Mar. 13. He retired in 1941.

Harry E. Green, 69, sales engineer in the construction equipment division of **Metalweld Inc.**, Philadelphia, died Mar. 12.

Irving H. Chase, 92, former president of **Waterbury Clock Co.**, Waterbury, Conn., now United States Time Corp., died Mar. 14.

"Look What The Superintendent of a Leading Steel Company Says! We'll send you his name on request."

"The Trabon System on our old blooming mill gives us 50 more steel tons per week! We credit this increase and savings to the elimination of rejects."



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TRABON ENGINEERING CORPORATION
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Production AND Engineering NEWS AT A GLANCE

NO SECRET INGREDIENTS—Three major requirements in armor plate for tanks, says Col. B. S. Mesick, head of Ordnance research and materials, are soundness, hardness and toughness. Definite correlation between these properties of steel and ballistic performance against conventional armor-piercing ammunition has been established, making it possible to use laboratory tests for quality control and acceptance of armor. The colonel told the S.A.E. recently in Detroit that steel mills and foundries working in close co-operation with Watertown Arsenal have been able to obtain combinations of hardness and toughness in sections 6 inches and over in thickness which a few years ago would have been considered impracticable if not impossible. Incidentally, ferritic instead of former austenitic electrodes have been developed for use in welding rolled armor.

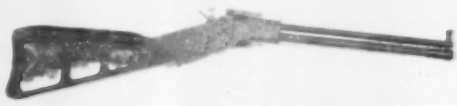
BORED WITH BORON—An experienced open-hearth furnace operator, with perhaps characteristic pessimism, says: "So far, all this boron activity is just talk. It is difficult stuff to handle. Analysis is tricky and erratic. And each peddler is trying to push his particular type of boron carrier as the best. We are making some boron-treated ingots experimentally and most of the boys at the plant think the stuff is much over-rated. Time will tell."

IRRADIATE TO TRACE—Dispersion pattern of alloys in steel can be traced by making a small amount of the alloy radioactive, mixing with the molten steel and then taking "autoradiographs" on film. The latter compare favorably with photomicrographs and may assist in the study of microstructures of high-temperature alloys, for example. —p. 78

TAILORED LUBRICANTS—Know why gears fail? Change in metal structure, abuse or excessive overloading are the usual culprits, seldom faulty lubricants. That is not to say careful compounding and selection of gear lubricants are not important—they most certainly are, and they are closely related to the dozen or more types of observed gear tooth failures. Basic data on lubricants, additives and functions have been developed by leading oil companies. —p. 79

HEAT TREATING INTEGRATED—Speed, cleanliness and precision of induction hardening and quenching in a single fixture have come to be recognized as powerful selling points for the method, resulting in an ever-widening circle of applications. Always alert to new techniques, two of the big auto companies have set up induction equipment on automatic screw machines for hardening inner surfaces of small wing bushings and bearing races required in volume for universal joints. Slight changes in steel specification and cutting oil (used for the quench) were made and a neat job of selective heat treating now is routine, with cumbersome carburizing furnaces delegated to other jobs. —p. 74

SPARKS AND FLASHES: Ultrasonic testing of large steel forgings to discover such defects as internal bursts and nonmetallic inclusions is both feasible and practical, pointing the way to higher general quality standards . . . Earl Smith, Republic Steel chief metallurgist, calls it the "sorry truth" that government stockpiling cannot replace the cargoes of nickel, molybdenum and alloy steels the U.S. sent under lend-lease to former allies, including the Soviet Union . . . Ford is casting 65,000 engine valves a day by the shell molding process, using a specially developed turntable arrangement which carries a series of molds through the complete cycle of preparation, baking, backing-up, pouring and shakeout. Some difficulty is being experienced with cooling the steel shot used to back up the mold shells, even though there is around 60 tons circulating in the system . . . Approximately 50 tons of aluminum alloy materials are used in the B-36 bomber; at least, so says Alcoa . . . A New Jersey manufacturer is talking up a new process he has developed for silver plating steel wire and rod at a cost said to be comparable to nickel or brass-plated material. How about some silver-plated bird cages? potato mashers? dish strainers? curtain rods? paper clips? . . . Combination rifle and shotgun, accurate up to 200 yards and weighing 3½ pounds, has been perfected



by Army Ordnance for the Air Materiel Command which will use the new caliber .22/.410 M-6 in survival kits for flyers operating over remote areas . . . Hot press moldings of fiberglass and polyester styrene resin have been successfully substituted for drawn aluminum in washing machine tubs and for Monel metal in hot water tanks for such machines . . . You can buy an "electronic secretary" which will answer telephone automatically, take messages and tell the caller when you will return. Not susceptible to cocktails-and-dinner routine either. —A.H.A.

Metalworking Outlook—p. 37 Market Outlook—p. 137

Small Parts Bore Hardened on

Bearing races and bushings processed on eight-spindle automatics, with 8-10 second induction hardening cycle

INDUCTION hardening and quenching of universal joint bearing races and wing bushings for Ford and Mercury passenger cars right on the screw machines which turn the parts from bar stock has replaced the more expensive and time-consuming method of gas carburizing the parts in rotary retort furnaces after copper plating and machining off the areas to be hardened (STEEL, April 24, p. 74). A battery of 2¼-inch Conomatics is handling the job at the general manufacturing division of Ford Motor Co. on Mound road, Detroit.

The machines are eight-station automatics, with an induction hardening coil and quench arbor mounted on the tool slide of the seventh station. Sequence of operations is as follows:

1. Feed bar stock and drill
2. Cone drill, counterbore and rough break down the OD
3. Bore, recess and second rough breakdown the OD
4. Ream and semi-breakdown
5. Burnish and finish radius
6. Finish counterbore, face and breakdown for cutoff
7. Induction heat treat
8. Cut off

Change was made in the steel specification, from resulphurized or free-cutting SAE 1117 to a modified SAE 1144 which can be hardened to a range of 59-64 Rockwell C.

The induction hardening arbor is cam driven on the tool slide, just as are the conventional tools, except for a special design of the cam to move the coil into position rapidly and hold it there during the brief hardening cycle, instead of a slow feed into the work. The coil consists of three turns of copper tubing mounted in a micarta backing, with clearance of 0.020-inch between the coil and the work. Cooling water is forced through the tubing under pressure of 140 psi. Quench solution is forced through radial holes drilled in the micarta mandrel, as well as through the end. Heat exchanger in the coolant reservoir of the machine keeps the solution at proper temperature.

Cycle on one type of bearing race is 1.7 seconds for heating and 6 seconds for quenching; on another design 2.3 seconds for heating and 8 seconds quench. Thus, total heat treat cycle time is figured 8-10 seconds. A cam on the end of the spindle actuates a limit switch which in turn starts a timer controlling the period of current application and energizing a solenoid to open and close the quenching oil valve.

To minimize excessive smoking and to eliminate objectionable odor, a change was made from sulphurized lard oil to a straight paraffin oil with 100 (Saybolt) viscosity rating. Oil is circulated by pumps under 100 psi pressure and the only loss is the small amount carried off on finished parts.

There is to be a battery of ten automatic screw machines equipped with hardening arbors for this bearing job. Three handle production of Mercury parts and seven are assigned to Ford parts. This accounts for only 60 per cent of total production requirements, the balance being purchased on the outside.

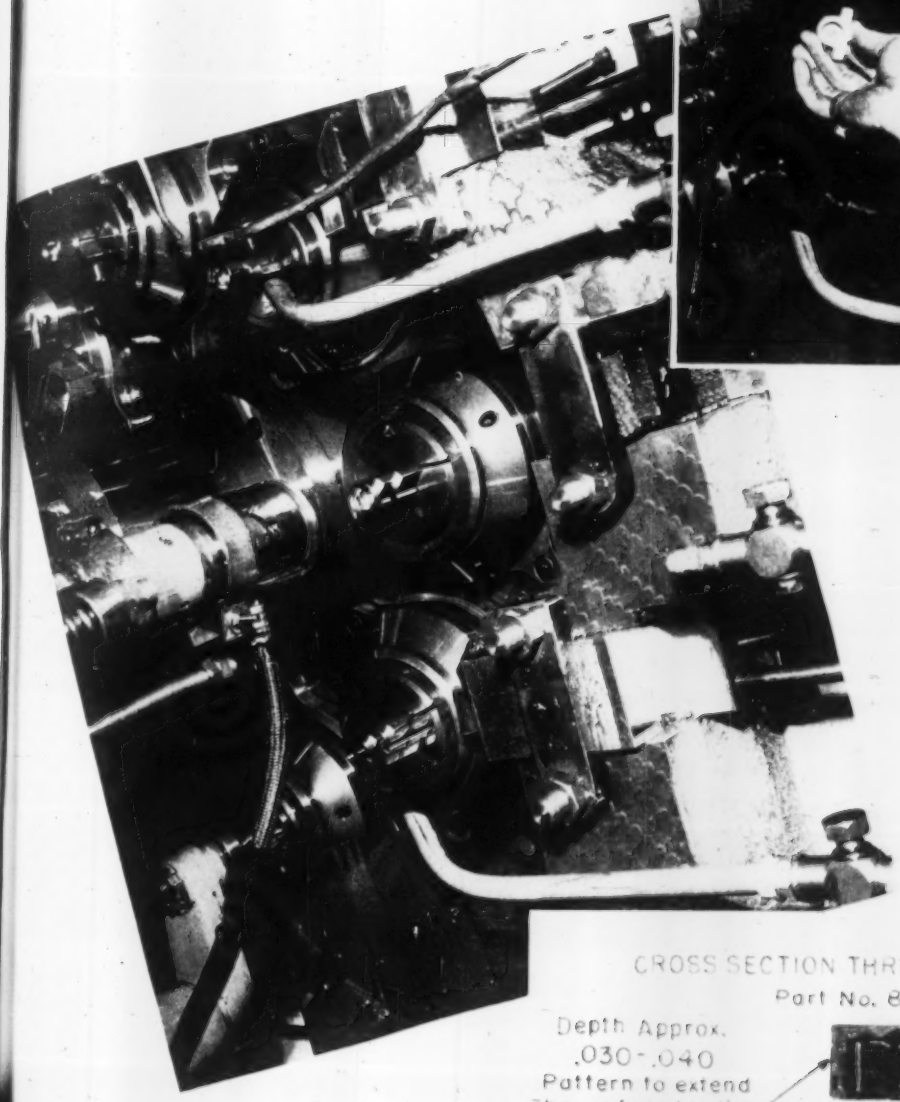
Each two automatics is supplied power by a single 450-kilocycle electronic oscillator, these units being located on a balcony directly above the automatics. Power is carried by coaxial cables (3-inch copper tube with a smaller tube mounted inside coaxially on equispace insulators to give the proper impedance). This type of conductor, carrying 3000 volts at 78-90 amperes, minimizes transmission losses and eliminates possible radio and television interference patterns from high-frequency radiation. Voltage on the inductor coil is stepped down to 400 by means of a transformer mounted on the machine.

Hardness of the processed parts is checked twice an hour and a case hardness pattern across a single part is traced hourly to see that the heating and quenching cycle is keeping within quality limits. When the job was first started, special training was given to foremen, inspectors, job setters and electricians so they would be thoroughly familiar with the entire sequence of operations and might more readily detect sources of trouble.

This is one of the induction coils wound on a micarta mandrel. Cooling water is forced through the coil, and quench soution through holes in the mandrel

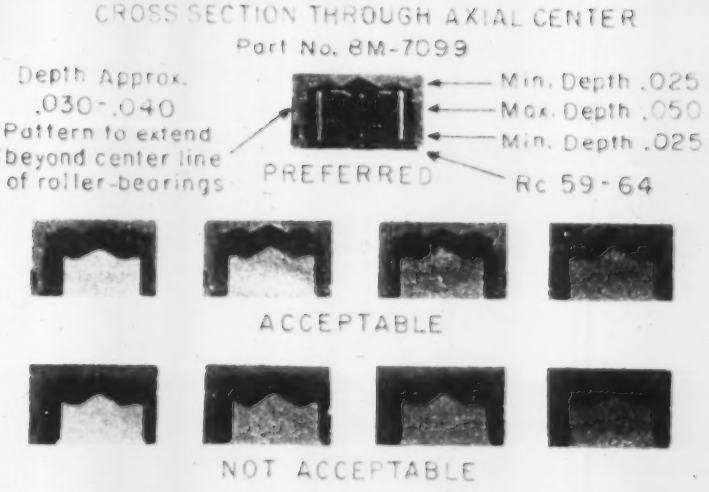
Screw Machines

By A. H. ALLEN
Associate Editor, STEEL



Above—Operator holds wing bushing hardened on the bore by the induction heating and quench arbor just beyond his fingertips

Left—Closeup of induction hardening station of eight-spindle automatic, showing wing bushing ready to receive the advancing hardening arbor, covered with plastic shield



Right—Portion of a case hardness pattern chart set up in the plant for inspectors who can check production samples against it for quality control

BRASS STRIP . . . Annealed and Cleaned

CONTINUOUS annealing and pickling of brass strip is performed at a 1000 to 6000-pound per hour clip on an integrated automatic system at American Brass Co.'s new sheet and strip mill in Buffalo. Designed by W. S. Rockwell Co., the installation processes 26-inch wide strip in gages ranging from 0.003 to 0.040-inch.

The initial set of operations involves preparing the strip for the annealing furnace. Coils of brass strip are placed on a loading table in front of two uncoilers containing cylinders and handling mechanism to uncoil the strip. The uncoilers are built of heavy fabricated steel plate with hydraulic lifting and holding mechanisms that may be altered in design to fit the particular mill conveyor system.

Next the stitcher receives the uncoiled metal strip and joins the end of one coil to the leading end of a new coil, producing the continuous strip for which the process is designed. The pneumatically-operated stitcher accomplishes its tasks through a set of dies which crimp the metal and insert the brass or wire stitch, while a set of guides holds the ends of the two coils in alignment. A looping pit receives the strip while the stitch is being made.

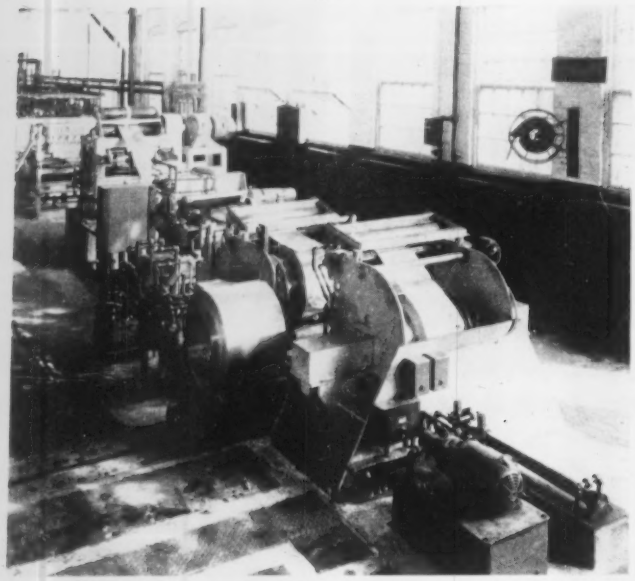
To keep a constant catenary height in the furnace, the strip then goes through a tension stand. This stand also automatically determines the safe tension to be applied to the particular gage of brass being processed.

Metal Preheated—First part of the heating process consists of preheating the brass with high-heat type gas burners which fire on the top and bottom of the strip just before it enters the furnace. Purpose of this operation is to preheat the metal and to dull its bright surface, permitting it to absorb heat uniformly in the annealing furnace.

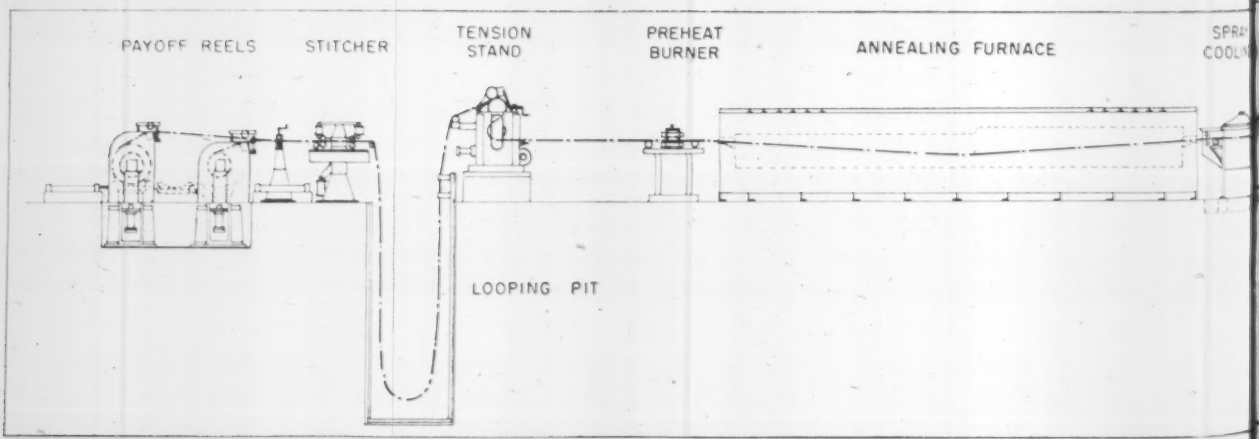
The strip then moves directly over alloy rolls into the annealing furnace. This furnace is 30 feet long, 36 inches wide and burns 900 Btu gas with burners firing above and below the strip. Construction is of 3/16-inch steel plate with buckstays forming the main support, so as to make the furnace portable. Insulation consists of 4½ inches of 2300° F brick backed up by 7 inches of standard insulation. Three 18-inch diameter fans not only recirculate the hot gases throughout the interior, aiding greatly in heat transfer to the metal, but create a turbulence sufficient to increase the rate of heat transfer. The two-zone furnace control is effected by a recording controller and valves.

The brass strip is cooled in a totally-enclosed cooling unit designed to eliminate heat dissipation into the surrounding area. Blowers, sprays and drains are included in the equipment. The cooling medium is air saturated with water which, when blown thoroughly over the strip, provides sufficient cooling without causing the thin metal to buckle. Actually, the mixture of steam and air, or finely divided water and air, does not harmfully alter the properties of the brass.

The main pull-out stand for the furnace is a fabricated steel structure powered by a DC motor, having two 16-inch diameter rubber-covered rolls and one



Left—View from starting end of annealing line, showing strip proceeding from pay-off reeler (uncoiler) through stitcher toward furnace



Continuously

4-inch diameter rubber-covered snubber roll. The strip is showered with water at its contact point with the lower roll to prevent overheating of the rubber covering; this is accomplished without danger of buckling or curling the metal.

Stainless Pickling Tanks—Pickling and cleaning are carried out in two stainless steel tanks, one containing acid and the other a bichromate solution. The first tank is equipped with two large rubber-covered rolls, the bearings of which are set in a separate framework. As the strip moves along, these rolls immerse it in the acid. A flinger collar on each roll prevents acid from creeping up the shaft into the bearings. Because the rolls are set on a separate framework, it is difficult for them to move out of alignment, thereby eliminating the possibility of strains which may damage the strip. The metal is sprayed as it leaves the tank to remove oxide accumulation which usually collects on the upper surface. Wringer rolls aid in removing excess acid from the strip surface prior to entering the brush box.

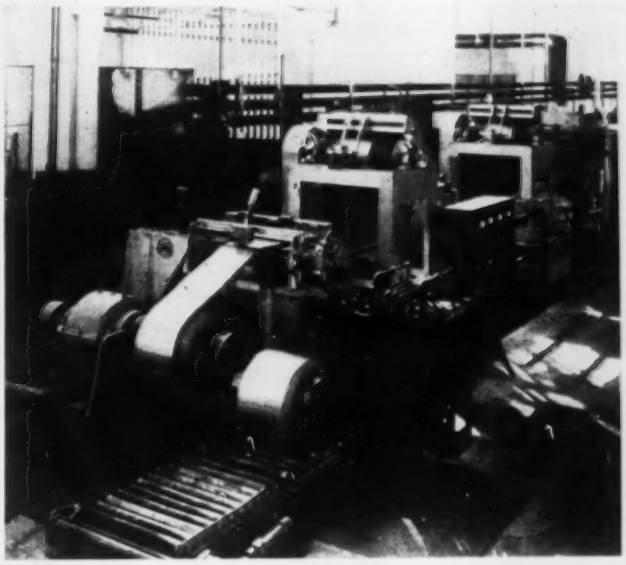
In the brush box, two Tampico fiber brushes, oscillating back and forth about 1½ inches either side of center, clean the strip surfaces of all oxide and sediment. The brushes are set at an angle to afford minimum wear of both brushes and anvil rolls. The brushes and the anvil rolls, upon which the strip actually rides, are motor-driven. The easily-replaceable brushes may be stainless steel, if the scale to be removed is heavier or harder.

The bichromate tank through which the strip can pass for cleaning, is equipped with a stainless steel cover, sprayers, rolls and pump used for uniformly circulating the bichromate. Bichromate is seldom used because the strip is bright and clean enough at this stage so that no additional help is needed.

The strip then passes into a second brush box, identical with the first, for another brushing, whence it moves into a stainless steel hot water rinse tank, with rubber-covered rolls for immersing the strip in the water. These rolls run in bearings located on a separate steel framework. A float control included in the mechanism maintains the water level constant at all times. The tank is equipped with steam coils plus a temperature-regulating device.

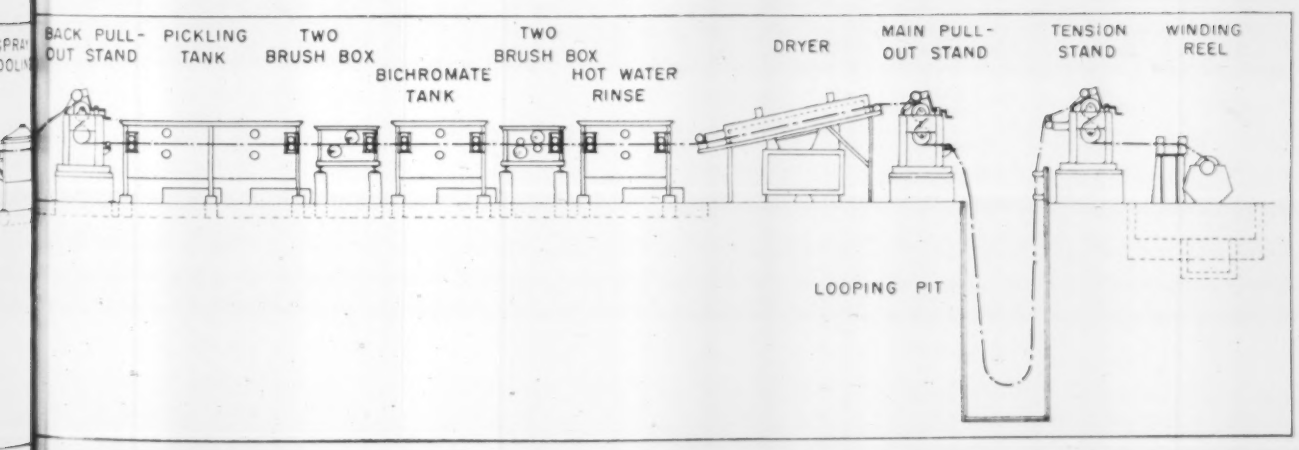
Strip Recirculation Dried — Recirculation drying, the final step, is accomplished by high-velocity air which thoroughly removes water from the strip surface. The dryer at the same time raises the temperature of the strip just high enough to assure complete moisture removal without causing metal discoloration. The strip then moves to the main pull-out stand similar to the mechanism previously described. The hydraulically operated coiler, which follows next, is actuated by an electric eye which scans both edges of the strip, keeping it in alignment so that one side of the coil is straight.

The coiler or winding reel is of heavy mill construction, with a hydraulic mechanism for collapsing the block and pushing the finished coil onto a buggy. All motors except the one powering the brush box are controlled by a variable speed control unit. This instrument keeps the strip moving throughout the entire process at a constant speed with no pulling or scratching.



Right—At the finish end, cleaned and dried strip is rewound on reel

Below—Side elevation showing the complete 160-foot continuous brass annealing and cleaning production line



Radioisotopes Aid Studies of High-Temperature Materials

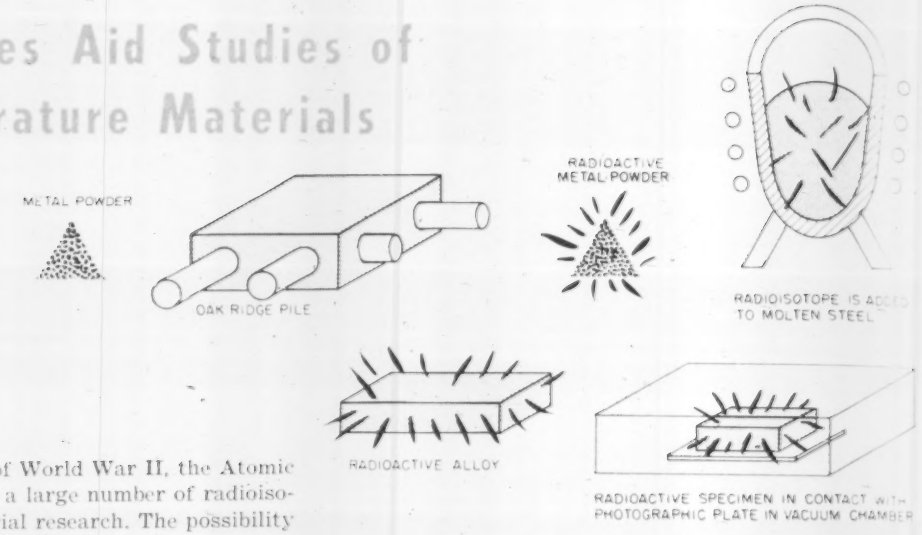

METAL POWDER
OAK RIDGE PILE
RADIOACTIVE METAL POWDER
RADIOISOTOPE IS ADDED TO MOLTEN STEEL
RADIOACTIVE ALLOY
RADIOACTIVE SPECIMEN IN CONTACT WITH PHOTOGRAPHIC PLATE IN VACUUM CHAMBER

Fig. 1—Schematic diagram of a use of radioisotopes in metallurgical research. Powder is irradiated, added to a melt, the metal cast and a polished specimen placed in contact with a film. The resulting photograph is shown in the lower left-hand corner

By W. E. JONES
Thomson Laboratory
General Electric Co.
Lynn, Mass.

SHORTLY after the end of World War II, the Atomic Energy Commission made a large number of radioisotopes available for industrial research. The possibility of using these isotopes as "tracers" to assist in studying the microstructure of high-temperature alloys was soon recognized. A typical sample is shown schematically in Fig. 1.

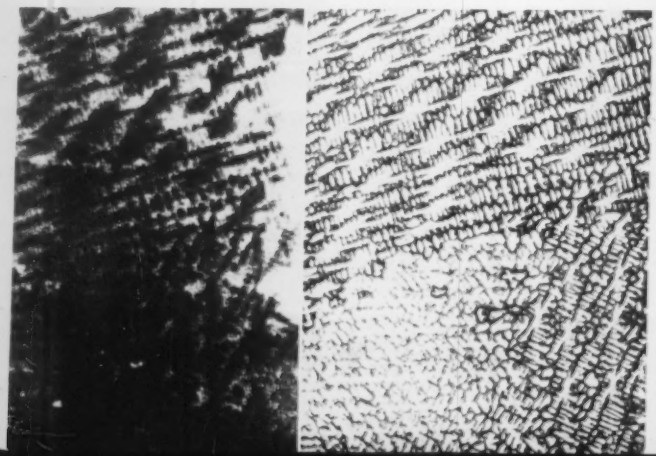
Study Safety Factors—Before the use of radioisotopes is considered for any application, a study must be made of the health physics problems which will be encountered. Three types of radioactivity are produced by tracer elements; these are known as "alpha," "beta," and "gamma" rays. Alpha rays usually are produced by the naturally-radioactive elements such as radium, and are not often met with in tracer work. Beta rays are common in isotopes and will penetrate up to several meters of air, depending upon their energy. The distance these rays will travel in any element is approximately inversely proportional to the density so that, in steel, they will penetrate only a few thousandths of an inch. Gamma rays, which also occur in isotopes, are very penetrating.

If the type of radiation, its energy, and other factors are known, it is possible to establish safe working distances insofar as exposure is concerned, since maximum safe body exposure is well established. Actually, monitoring instruments are used to determine safe working distances. Every effort should be made to prevent radioactive particles from getting inside the body, as only small quantities can be tolerated.

The following general precautions were observed during the investigation reported here:

1. The alloys were melted under controlled exhaust systems with dry filters which could easily be removed and destroyed.
2. The exhaust systems were smoke-tested regularly.
3. Leather gloves were worn when handling the radioactive casting.
4. Cutting and grinding was done under controlled and filtered exhaust systems.
5. All cloths, papers, polishing and other equipment were monitored and held until the count was low.
6. A survey meter was used at all times to insure that the total body dosage was below the safety limits, and to make sure that the working areas were cleaned up.

Fig. 2 (Left)—Autoradiograph of a nickel-chromium-tungsten alloy enlarged to about 50 diameters. The exposure required 75 hours and was made on Kodalith film. Tungsten-rich areas appear dark. A comparison with the photomicrograph (right) of the same area shows that the tungsten is well concentrated in the dendrites



Tungsten Isotope Used—Due to current interest in a cobalt-base alloy containing tungsten and columbium, it was decided that radioactive tungsten isotope would be used. Accordingly, after AEC approval was obtained, tungsten (wolfram) powder was sent to Oak Ridge to be irradiated in the pile. Approximately $1\frac{1}{2}$ grams of powder were used, at a total cost of about $100. When the irradiated tungsten powder was returned, it was mixed with additional powder and briquetted for addition to melts. This procedure eliminated the dust hazard.

The initial calculations showed that 1 millicurie of activity (approximately 0.15 grams of irradiated tungsten) to 100 grams of melt should be sufficient to permit exposure in a reasonable length of time. It was soon determined experimentally, however, that it was necessary to use 1 millicurie to each 10 grams if exposures were to be made on fine-grain films, such as Kodalith, in a reasonably short time.

How To Reduce Gear Failures

Successful lubrication of all types of gears is the result of progress in understanding the function of extreme pressure additives and of selecting additives to perform satisfactorily at different operational severity levels

By A. F. BREWER and P. J. KEATING
Technical & Research Division
Texas Co.
New York

WITH the continuing trend toward packing more and more power into smaller and smaller packages, responsibility for safe, continuous and quiet operation of modern mechanisms rests heavily on gearing. This in turn has laid heavy responsibilities on gear designers, metallurgists, gear cutting and finishing specialists and on lubrication engineers.

Their primary theoretical efforts must be to create gears and gear mechanisms which will not fail, and to compound lubricants which will stand up under extreme conditions. At the same time they must understand how to diagnose gear failures — both service and laboratory-induced — so that theories can be corrected to meet practical conditions. This article is mainly concerned with constructive diagnosis of failures and what to do about them.

How Gears Fail—When a gear tooth fails it may involve actual breakage of one or more of the teeth, or there may be failure of the tooth surfaces. Tooth breakage is rarely attributable to faulty lubrication. Change in metal structure, abuse or excessive overloading are more usually the cause.

Lubricants which would otherwise be amply protective cannot insure against failure under such conditions, nor can they always keep the temperatures within reasonable limits. Abnormal temperatures from any source can cause imperfect surface lubrication with resulting excessive friction. Then scoring and/or scuffing may develop, along with perhaps softening and cracking.

Under such conditions, the temperature over the contact areas of the teeth has probably become high enough to reduce the viscosity of the oil film to such an extent that the lubricating value of the film on the teeth is negligible. If this continues, more friction, more heat, less lubrication and more tooth failures will result.

On exposed gears, the lubricant must be adhesive

GEAR OIL ADDITIVES

TYPE OF ADDITIVE	FUNCTION IN LUBRICANT
Pour Depressant High Mol. Wt. Polymer or Wax Naphthalene Condensation Product	Reduce the pour point or channel point of the lubricant so that it will flow freely at reduced temperatures.
Viscosity Index Improver High Mol. Wt. Resin	Improve the viscosity—Temperature relationship of the lubricant to minimize viscosity spread over service temperature range.
Foam Depressant High Mol. Wt. Silicone Polymers	Prevent foam or accelerate foam collapse.

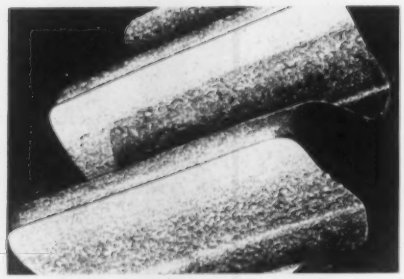
Extreme Pressure and Polar Agents

	Function
Type 1 No additive	General lubrication
Type 2 Noncorrosive Type Sulphurized Fat	Prevent welding by: forming an easily sheared film-iron sulphide.
Type 3 Noncorrosive Type Lead Soap Sulphur Phosphorus	Prevent welding by: (a) forming an easily sheared film: iron sulphide, lead sulphide, etc. (b) forming a low melting point phosphorus alloy.
Polar Agent (optional)	Reduce friction: Metal to metal contact or between easily sheared films.
Type 4 Corrosive Type Lead Soap Active Sulphur	Prevent welding by: forming an easily sheared film: iron sulphide, lead sulphide, etc.
Type 5 Noncorrosive Type Chlorine Sulphur Phosphorus	Prevent welding by: (a) forming an easily sheared film: iron chloride. This action is catalyzed or speeded up by the presence of sulphur and its compounds. (b) forming a low melting point phosphorus alloy.
Type 6 Noncorrosive Type Lead Soap Sulphur Chlorine	Prevent welding by: forming an easily sheared film: iron sulphide and iron chloride. The formation of iron chloride is catalyzed by the presence of sulphur and its compounds.
Polar Compound (optional)	Reduce friction: Metal to metal contact or between easily sheared films.

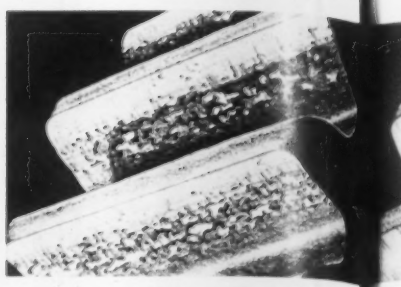
Type of Gear	Normal Operation	Heavy Duty Extreme Pressure Lub. Required
Spur	yes	
Bevel	yes	
Spiral Bevel	yes	
Annular or Internal	yes	
Helical or Herringbone	yes	
Worm	yes	
Rack and Pinion	yes	
Spur	yes	
Bevel	yes	
Spiral Bevel	yes (and break in)	
Spur		yes
Bevel		yes
Spiral Bevel		yes
Annular or Internal		yes
Helical or Herringbone		yes
Worm		yes
Rack and Pinion		yes
Hypoid	yes High speed—low torque with shock loading.	
Hypoid	yes High speed—low torque	yes Low speed—high torque
Hypoid	yes High speed—low torque	yes Low speed—high torque

Examples of conditions leading to gear failures . . .

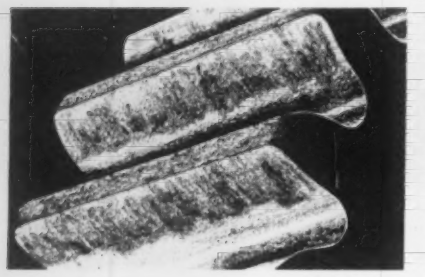
. . . Normal wear



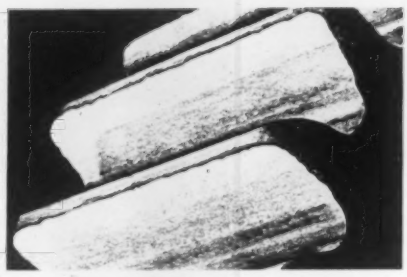
. . . initial pitting



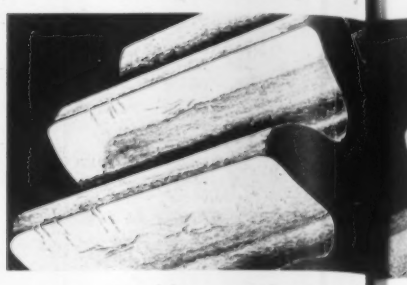
. . . progressive pitting



. . . burning



. . . rolling and peening



. . . cracking and checking

as well as viscous—otherwise the film cannot resist the action of centrifugal force. There is no continuous replenishment of lubricant on the surface by dip or spray as is possible with enclosed gears.

Where dealing with bath or dip-lubricated gears, the lubricant is chosen so that at the operating temperature the viscosity will be sufficient to train with the teeth. If the oil is too light an insufficient amount may be carried by the dipping gear to the companion gear or worm. In this case, the cooling ability of the lubricant will be lost. Under such conditions, a worm gear for example, may run so hot as to cause the threads to soften and crack, or to result in wiping of the bronze teeth of the worm wheel. For this reason, some designers improve the adhesiveness of a worm gear oil by using a compounded product containing a polar agent.

Other authorities feel that a lubricant containing lead naphthenate which has mild E. P. (extreme pressure) properties and which is noncorrosive to copper, bronze or steel, provides reduction in friction load, lower temperature at the interface surface and increased efficiency. In a worm gear, the rate of sliding is greater than in a spur, bevel or helical gear.

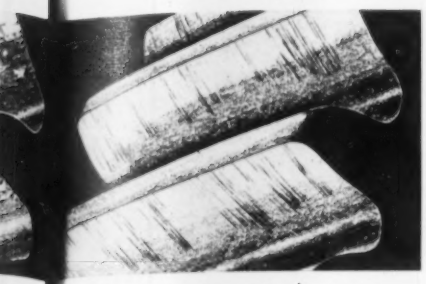
Tooth Surface Wear—When the tooth surface of a gear becomes impaired, it may progress through several recognized stages. First, more or less abrasion or rubbing off of the metallic surfaces occurs. Spur, helical or bevel gears will often become smooth and highly polished during the initial stages of abrasive wear. To some extent this could be regarded as a "wearing-in" procedure. It is regarded as being related to the viscosity of the gear oil, as it is apt to occur more rapidly with lower viscosity lubricants. A heavier oil or one with E. P. characteristics will present a more durable film and retard wear.

High tooth loads and low speeds also contribute to excessive wear if the viscosity of the oil is not chosen accordingly. Evidence of wear is most pronounced below the pitch line of the pinion if lubrication has been ineffectual. While abrasive wear is progressing the theory is that the fine metallic particles worn off the teeth mix intimately with the oil film to develop a lapping action. The best "wearing in" or "running in" action is that which results in polished low friction surfaces with minimum of metal removal from the gear tooth surfaces. All this is accomplished by the proper selection of viscosity and additive combination in a suitable base oil.

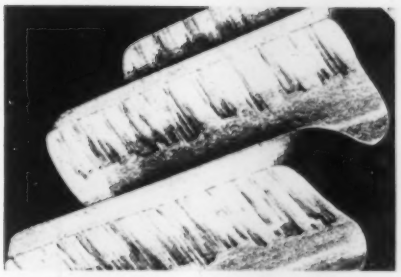
Scoring and Galling—Scoring and galling often follow abrasive wear due to actual metal-to-metal contact. Here wear is more severe and tearing of the tooth surfaces is evidenced. Normally this occurs in the direction of sliding. Scoring develops regardless of the hardness of the tooth surfaces, but it often may show more of a tearing nature and develop into galling with softer surfaces where total absence of any oil film has permitted welding to occur between the high spots which may be present on the tooth surfaces.

In the case of steel on steel, the lubricant present, even the adsorbed polar molecules, cannot always prevent minute high spots from deforming and breaking off to form fresh surfaces of clean metal. When two freshly formed surfaces slide over each other the local temperature at these spots becomes very high because a considerable amount of heat must be dissipated over a very small area. As a result, welding takes place, and the rupture of the metal to form more fresh surfaces occurs.

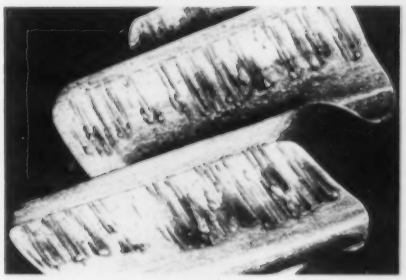
So long as the high spots on the teeth are at all times separated by several molecular layers of oil there can be no wear. If the mechanical attack at the contact areas by metals rubbing together becomes



. . . abrasion

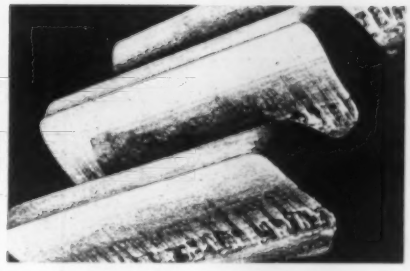


. . . scoring



. . . galling

. . . chipping



. . . gouging

. . . overload and breakage

. . . fatigue and breakage

severe enough to remove the ultimate protecting film, the rubbing clean metals will seize, possibly causing irreparable damage to the surfaces. This seizure, which is welding on a small scale, can become progressive to result in the gross removal of metal.

More Metal Torn Off—If conditions are right, more and more metal is torn off. By this time most of the prominent high spots have been removed and instead of welding of the small peaks of a few high spots, larger areas weld. This is aggravated as the speed and load are increased. With the higher loads the maximum localized temperature is reached at a lower speed, and conversely at a high speed, the load required to reach maximum high spot temperature is lower than at slow speeds.

Volume or thickness of the oil film under the prevailing pressure and sliding velocity determines whether or not an E. P. lubricant is necessary. When the oil film is too thin to prevent metal-to-metal contact, the use of an extreme pressure oil should be seriously considered. Beyond boundary lubrications, it is essential to counteract with additives the shock or intermittent loads as well as the continuous loads which develop at any speeds.

One of the most difficult problems of lubrication which has developed in recent years is in connection with hypoid gears. Intensity of load and speed of rubbing are such that a special lubricant is required. Wherever high power losses and wear prevail there is a problem. Under high loading the oil film between the high spots becomes extremely thin. So long as it exists at all there can be no clean metal contact, and therefore no abrasion, but this condition can only continue so long as the rate of removal of the film does not exceed its rate of renewal.

In industry, where gearing is adequately proportioned in line with American Gear Manufacturers' Association practice, and housed, comparatively fluid lubricants are generally applicable. They are applied to the gear teeth and bearings either by force feed lubrication or splash in contrast to automotive service where bath lubrication prevails.

Pitting and Surface Cracking—Pitting involves the formation of small pits in the tooth surfaces, usually starting in the vicinity of the pitch line, and frequently occurring during the initial period of gear operation.

Pitting is related to surface cracking; it is a fatigue failure. It involves actual removal of surface material to a depth dependent upon the localization of stress. While it occurs very often at low speeds and at low operating temperatures where high torque prevails it is not restricted to low speed.

Where constant repetitive shock loading or hammer action is induced by some action in the machine, a condition akin to fretting corrosion occurs which can cause the teeth to pit.

Lubricants Vary—During the transition in gear design, gears, of course, had to be lubricated, even though there was no scientific procedure for ascertaining the most suitable viscosity for any or all cases. Practical experience over the years resulted

in the development of a considerable variety of lubricants. Today they vary all the way from straight mineral oils to intricate mixtures.

Any finely divided solid material which serves only as a thickener and has little or no lubricating value is not recommended for modern gearing. It may very well be deceiving in that an uninformed user may believe that his lubricant is suitable, when, in reality, it is giving comparatively poor protection against wear. The necessary adhesive characteristics also may be relatively low. As a result, when used under high-speed conditions, or wherever the gears may come into contact with water, acids, alkalis, or chemical fumes, the gear teeth may lose their protective film of lubricant, due either to its being thrown off by centrifugal force, or washed from the wearing surfaces.

A gear oil additive is a chemical compound which either imparts new properties to the mixture or else chances the properties which are already inherent in the oil.

In the formulation of gear lubricants the additives used generally fall into fairly well defined groups depending on the type of gear and the conditions of operation involved. The table shows this graphically in a very simplified form.

Stainless Steel Sphere Fabricated from Shaped Plates

A UNIQUE stainless steel spherical storage chamber — a "nitro-sphere"—for use by the Air Force in rocket-propelled aircraft experiments was completed by Research Welding & Engineering, South Gate, Calif. The nitro-sphere is stressed to contain 200 gal of liquid nitrogen at 5500 psi pressure at −340° F. It is 54 inches in diameter, weighs 7500 pounds and is constructed from stainless steel plate stock 3 11/16 inches thick.

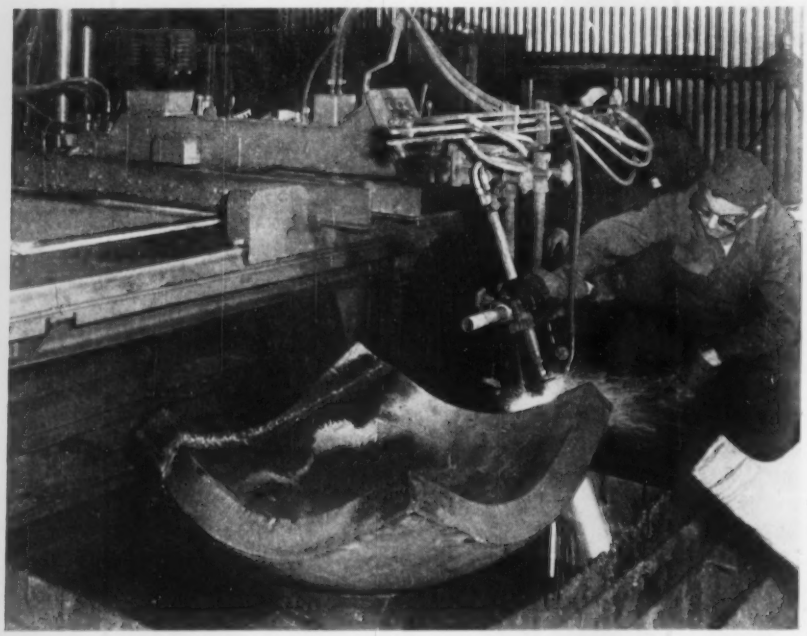
Design specifications of low weight and high stresses called for unusual fabrication methods. Allegheny Ludlum supplied six 3.687-inch x 38 inch x 38 inch stainless steel plates, rolling them as a special lot from 347 ASTM-A240 Grade C stock. The National Supply Co. of Torrance, Calif., formed the plates to 22.5 inches spherical radius. A die and punch pressed the plates to shape after preheating them to 1700° F. The plates were then laid out and trimmed on flame cutting equipment at Jorgensen Steel Co.

An innovation in layout enabled the shaped plates to be both trimmed and beveled in the same operation. The parts were then fitted and held temporarily in place with thin backing plates. All segments conformed symmetrically, and there was no joint misalignment.

First weld passes were made with Heliarc welding. These welds were then subjected to inspection by both gamma ray and Dy-Chek, a dye penetrant. Following inspection of the first weld passes, the joints were filled by multiple pass arc welding. A ton of weld rod was required. The combined inspection processes were repeated several times as the different welds were built up.

Finally the sphere was heated to about to 1950° F for 3½ hours and then subjected to both internal and external quenching by high pressure jets. It was then hydrostatic tested at 10,000 psi pressure and again inspected.

After forming, plates are trimmed and beveled in one operation on this flame cutter at Jorgensen Steel Co. Use of flame cutting equipment saved an estimated 30 days' fabrication time



Multiple pass arc welding shaped plates. Nearly 1 ton of weld rod was used in filling the 3 11/16-inch deep joints

Increase

Cold Mill Production with . . . MESTA-THOMSON FLASH WELDERS

Mesta-Thomson Flash Welder installed in a Mesta High-Speed Continuous Pickling Line

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COLD ROLLING STRIP

An appraisal of today's theory and practice

Reasons why an increase in rolling speeds causes a decrease in friction coefficient, and the importance of lubrication as related to the coefficient of friction are explained in this the fourth of a series of articles on cold reduction practice

By J. D. KELLER
Consulting Engineer and Partner
Associated Engineers
Pittsburgh

BELIEVING that actual hydrodynamic oil film lubrication might exist near the entrance end of the contact length, the author made a study of the action of the oil-wedge formed by the approaching surfaces of the strip and of the roll, before contact begins, as at *A* in Fig. 17. For an actual numerical example, namely pass No. 5 of the author's 1942 paper, the angle between the strip surface and the roll surface at *A* is about 1.7 degrees of arc or 0.03 radian (from Fig. 9), and by a modification of Gumbel's equations as given in Appendix D, it was found that the curved oil-wedge between roll surface and strip is equivalent to a wedge between planes, having a length *B-A* in Fig. 17 of about ⅞-inch and turning about *A* with an angular velocity equal to that of the roll. Assuming that all the water in the palm-oil emulsion has been squeezed out first and that the wedge contains only palm oil at 170° F having a viscosity of 196 seconds Saybolt universal, the hydrodynamic pressure produced at *A* would not exceed 900 psi at 4000 fpm strip speed, or 225 psi at 1000 fpm.

Modifying Factors Are Cited—It is known that the viscosity of oil increases with increase of pressure; for palm oil, it seems to be about five times as great, under extreme pressures such as those existing between the surfaces in strip rolling, as at atmospheric pressure. Furthermore, when the surfaces separated by oil films are close together, the attractive field of the solid surfaces seems to modify the viscosity of the fluid between them. Terzaghi[22] found that the apparent viscosity of water is increased in narrow channels; Macauley[23] measured it, between parallel glass plates about 10 microinches apart, and found an increase of 11 times compared with the viscosity of water in wide tubes. Needs[24] tested parallel rotating hardened steel disks, optically flat, separated by films of vegetable and mineral oils, and found that under moderate pressure (up to 800 psi at least) the disks remained apart indefinitely at a distance of about 30 to 40 microinches, and that at low rubbing speeds, the oil acquired a sort of rigidity, or acted in some ways as if it had become solid.

Terzaghi attributed this to a thixotropic effect, or gradual building-up of a molecular structure

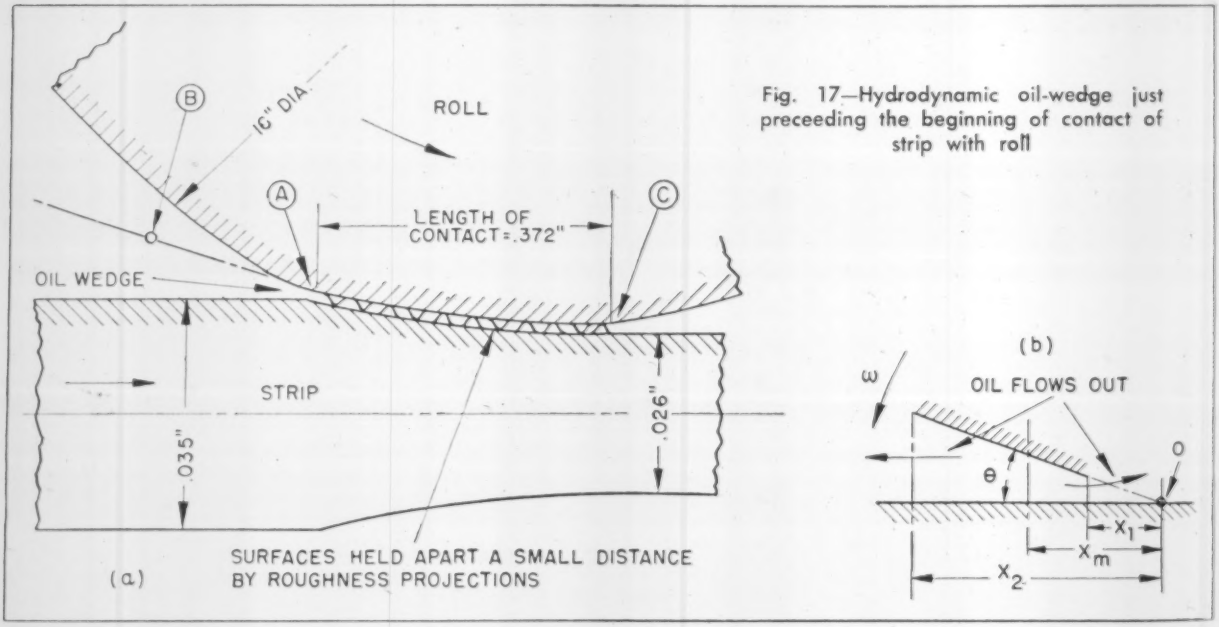

Fig. 17—Hydrodynamic oil-wedge just preceeding the beginning of contact of strip with roll

We're helping break up this

VICIOUS CIRCLE

THE more steel America produces the more machines are made—that means we need more gasoline, fuel oils and lubricants to operate the machines—so we need more steel to drill wells and to build pipe lines and refineries to provide the petroleum products to keep the machines running. It becomes a vicious circle—but we're helping break it up.

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(liquid crystals?) within the boundary films, while Elton,[25] investigating electroviscosity, considered it to be due to electrical attraction or the setting up of a streaming potential in the ionic-liquid layers, but concluded that the rigid layer on each surface could not exceed 0.1-microinch thick. In the case of oil, this would correspond to 1 to 3 molecules thickness of layer. But in either case—semirigid layer, or attached layer only a few molecules thick—we are brought right back to boundary lubrication rather than the hydrodynamic oil film.

Whether any or all of these phenomena would be sufficient to increase the comparatively negligible oil pressures previously stated, to the extreme pressure of about 70,000 psi which must be produced where contact begins at *A* if a hydrodynamic oil film is to exist there, remains doubtful. The probability seems to be, therefore, that true oil-film lubrication can hardly exist within the contact length.

Requires Change of Contour — Aside from the factors just mentioned, there would seem to be only one possible escape from this conclusion, and this would require the presence of a *rounding* of the strip contour instead of an abrupt change of the tangent to the strip surface at the point *A* in Fig. 17, where contact begins. The *roll* surface at point *A* shows no such abrupt change of slope, since its deformation is elastic. The *strip*, on the contrary, is plastically deformed, and strips released when part way through the rolls seem always to show the sharp crease or abrupt change of slope of the surface, as

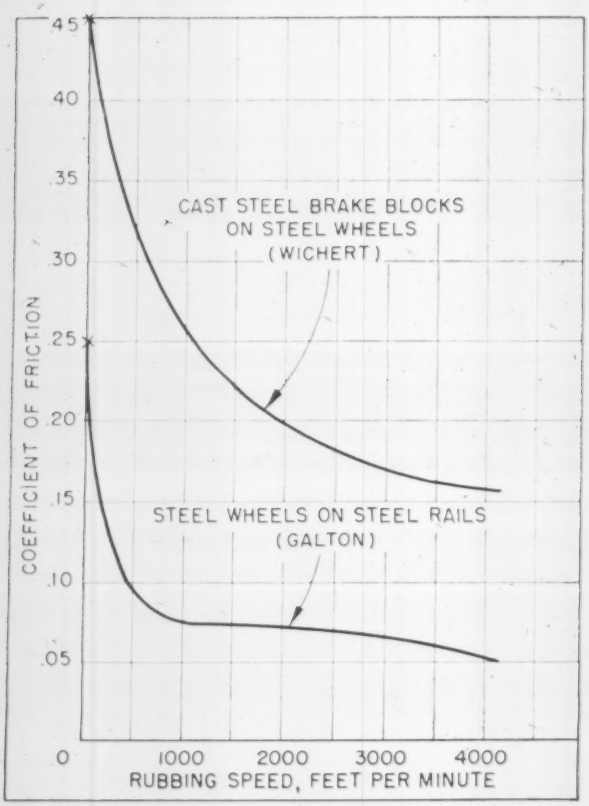

Fig. 18—Decrease of coefficient of dry friction with increase of rubbing speed

for example in Fig. 4. But as previously mentioned, a short zone of elastic contact of strip on roll exists at each end of the plastic-flow contact length. The elastic deformation disappears when the pressure is released, hence it would not appear in the strip when removed from the mill, although present when the strip is between the rolls. It is not entirely impossible that this effect might be sufficient to cause a rounding of the strip contour just at and to the left of point *A* in Fig. 17 which would reduce the angle between the roll and strip surfaces and allow the hydrodynamic oil-film pressure to build up to a much higher value than previously stated. The probability, however, is against it.

Nevertheless, the evidence points to an appreciable decrease of the friction coefficient with increasing speed of rolling, and for the explanation of this, in the usual case of lubricated surfaces of strip and rolls, we must fall back on Beeck's intimation of the abrupt change of friction (with oils containing fatty acids) occurring when the increasing speed of sliding attains a certain rather low value (which may, however, be higher than for decreasing speed as in Fig 14) and the drawing-in of additional layers of orientated molecules begins. The higher the rolling speed, the further would the *multilayer* boundary lubrication with its low coefficient of friction (Fig. 13) extend into the contact length and the fewer would be the points of metal-to-metal sliding. Judging from Fig. 13, however, even at high rolling speeds the coefficient of friction would not fall below 0.04 as its lower limit. It is true the Claypoole[26] found vanishingly small friction in boundary-lubricated surfaces of extreme smoothness, but this is not likely to occur with surfaces so rough (comparatively) as those of the strip and the rolls.

One fact concerning friction remains to be accounted for, and that is the observation made both by Nekervis and Evans[17] at Battelle and by J. R. Powell[27] and G. Kaufman[28] on the high-speed mill at Jones & Laughlin's Aliquippa plant, that the *quantity* of lubricant supplied affected the coefficient of friction. Nekervis and Evans state that differences in the quanity of lubricant "markedly" affected their lubricity ratings, yet their Fig. 4 showed a reduction of only about 4 to 7 per cent in the coefficient of friction for copious flow of palm oil as compared with that for "pre-oiled" conditions.

Two Factors Are Involved—Powell and Kaufman found that in their mill, in which the strip is lubricated with a mixture of about 1 part of palm oil to 5 parts of water, the better retention of oil on the top surface than on the bottom of the strip caused "skidding" to occur if the attempt was made to have the top roll transmit as much torque as the bottom roll, indicating that the friction coefficient is lower on the top roll; and they found that the division of motor load between top and bottom rolls could be controlled to a considerable extent simply by varying the amount of lubricant supplied above and below the strip.

Assuming that, for the reasons previously explained, this phenomenon is unlikely to be attributable to the action of the oil wedge at the entrance

end of the contact length, the only explanation of the effect which has occurred to the author is that the lower surface of the strip may actually lack sufficient oil to form a boundary film with an adequate number of layers of molecules. In the Aliquippa mill, the mixture of oil and water is sprayed on both the top and the bottom surfaces of the strip and then passes, on top, between the strip and a spreader roll riding on the latter; and on the bottom, between the strip and the tensiometer roll. Initially, there is plenty of oil on the surfaces; figuring 4 pounds of oil per ton of strip, if all of the oil remained on the strip surfaces, the average thickness of film would be about 0.0001-inch. But in each pass, practically all of the oil is squeezed off, and if the supply were equally divided among the passes the thickness of film would average about 0.00002-inch at the entrance to each pass, or about 200 to 600 molecules thick.

The oil squeezed off the upper surface of the strip by the spreader roll remains on top of the oncoming strip (except for what runs off at the sides) and is available for re-use, whereas the oil squeezed off from the bottom of the strip mostly runs down and away; besides, the pressure of the tensiometer roller below is probably considerably higher than that of the spreader roller on top. The thickness of the oil film on the under surface of the strip therefore may be greatly reduced. This tentative explanation may have to be modified as a result of further observations.

Summing up, the *average* value of the coefficient of friction between strip and rolls in cold-reducing mills appears to lie between 0.06 and 0.11.

Friction Coefficient Varies—In temper mills, which usually operate without lubricant, the friction coefficient is higher* but again decreases as the sliding speed goes up. Fig. 18 shows typical curves obtained by two different experimenters, showing the variation of the coefficient with speed, for dry friction between steel surfaces. The coefficient is known to be reduced, for given metals, when the smoothness of the surfaces is increased. Trinks suggested long ago that the decrease of the friction coefficient at higher speeds might be due to fusion of an extremely thin layer of metal at the points of contact, and the measurements of Bowden and Ridler seem to show that such fusion may occur.

Ford[3], in tests in the experimental mill at Sheffield, rolling steel and copper strip at speeds from 5 to 240 fpm, found that for passes later than the first, the roll pressure decreased as the speed rose, both when the strip was lubricated and when it was dry. The probable explanation of this is a decrease of the friction coefficient with increase of sliding speed.

Ford also found the interesting fact, known to the author from other experience, that nonpolar oil molecules such as those of straight mineral oils under some conditions can *increase* the coefficient above its value for dry surfaces. This is confirmed by Polakovski[29], who recommended, apparently on the basis of practice, that kerosene be used in temper mills to increase the coefficient of friction and likewise the brightness of the strip surface. Nekervis and Evans also found that kerosene produced the highest luster of strip surfaces.

(To be continued)

*Ford, however, found there was little difference in the friction coefficient (as indicated by the roll pressure) between rolling strip with dry rolls and with mineral-oil lubrication.

APPENDIX D—Calculation of Pressures in an Oil Wedge

As previously stated, the curved oil-wedge formed by the surfaces of the strip and of the roll, as shown in Fig. 17-a, can be replaced by an equivalent wedge between planes, as in Fig. 17-b. The upper plane turns about point O with an angular velocity ω relative to the lower plane. The angle between the planes, at the time considered, is θ. For this case, Gumbel[21] gives the equation for the variation of oil pressure over the length $(x_2 - x_1)$ as

$$p_x = \frac{6\,u \cdot \omega}{\theta^3} \cdot \left[\log_e \left(\frac{x_1}{x_2} \right) + \left(\frac{x_m}{2} \right)^2 \cdot \left(\frac{1}{x_1} - \frac{1}{x_2^2} \right) \right] \quad (11)$$

where distance x is measured from center of rotation O, and u is the oil viscosity.

This is on the assumption that the oil flows out at both ends of the wedge, and x_m has to be determined from the condition that the sum of the two outward flows must equal the volume displaced by the angular motion of the upper plane in unit time, and at x_m there is no flow in either direction. In the case of the rolls, however, because the oil flow to the right of point A in Fig. 17-a is practically impossible, the outward flow at the small end of the wedge in Fig. 17-b can be taken as zero, x_m becomes the same as x_1, and

$$p_x = \frac{6\,u \cdot \omega}{\theta^3} \cdot \log_e \left(\frac{x_2}{x_1} \right) \quad (12)$$

The length x_1 was determined from the consideration that at the beginning of contact, or point A in Fig. 17-a, if the root-mean-square roughness of the strip and roll is 35 microinches, the highest projections will hold the surfaces apart about $2\frac{1}{2}$ times this, or about 0.00009-inch. Then,

$$x_1 \approx \frac{0.00009\text{-inch}}{0.030\text{-radian}} \approx 0.0030\text{-inch}$$

However, even if the distance apart, and correspondingly the distance x_1, were reduced to as little as 1/10 of these values, the pressure would be increased by only about 40 per cent at the beginning of contact.

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Conveyor Maintenance Reduced

A new Alnico permanent conveyor element in three styles for carrying iron and steel products is announced by Eriez Mfg. Co., Erie, Pa. Standard sections can be used as the magnetic unit; maintenance is held to a minimum. Major magnetic field is perpendicular to material movement and maximum amount of conveyed material is subjected directly to the magnetic field.

The magnetic strength of the device is adjusted by changing the air gap between plate magnet and revolving members. Magnetic element can be removed for cleaning material or when conveyor is used for nonmagnetic operation.

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FLOOR PLATE
STEP ON IT ... IN SAFETY!
Hurrying workers have better protection with U·S·S Multigrip underfoot. Wet or dry, Multigrip's evenly-spaced, flat-topped risers offer positive traction in every direction. Vehicles roll easier on Multigrip, too. There are no gutters to catch narrow wheels . . . vehicles roll on the risers, not between them.
Multigrip Floor Plate makes floors stronger, longer lasting. It's attractive, easily cleaned . . . there are no pockets to hold dirt, grease, water. And it's permanent. Get further information about Multigrip from your nearest steel warehouse, or write to us direct.
United States Steel Company, Pittsburgh
Columbia Steel Company, San Francisco
Tennessee Coal, Iron & Railroad Company, Birmingham
United States Steel Export Company, New York
United States Steel Supply Company,
Warehouse Distributors, Coast-to-Coast
USS
MULTIGRIP FLOOR PLATE
UNITED STATES STEEL

Dynamometer Accuracy Up

Journal-type cradle bearings and hydraulic weighing system reported by GM engineers

SPECIAL journal type cradle bearings, similar in principle to the virtually frictionless bearings that support the huge Mt. Palomar telescope, are used on dynamometers to improve accuracy of measuring auto engine power output. Two General Motors Research Laboratories engineers, Warren H. Smith and Joseph B. Bidwell, reported this fact before the Society of Automotive Engineers sectional meeting in Detroit.

Their paper summarized a 5-year series of improvements in design and operation of dynamometers. In their operation accuracy is important, the speakers explained, because modifications of an engine under test may produce only small improvements or losses in its power output. Engineers would be likely to overlook those small but significant losses or gains, they said, if dynamometer equipment is too inaccurate to record them.

Design Features—Special bearings described by the GM research engineers consist of two semicircular pads that support the dynamometer cradle. The cradle resembles the housing of a standard electric generator or an oversize electric motor. Instead of a stationary mounting, such as the mounting of a generator or motor, the dynamometer housing is cradled between two bearings lubricated by a pressurized oil film so no metal-to-metal contact occurs.

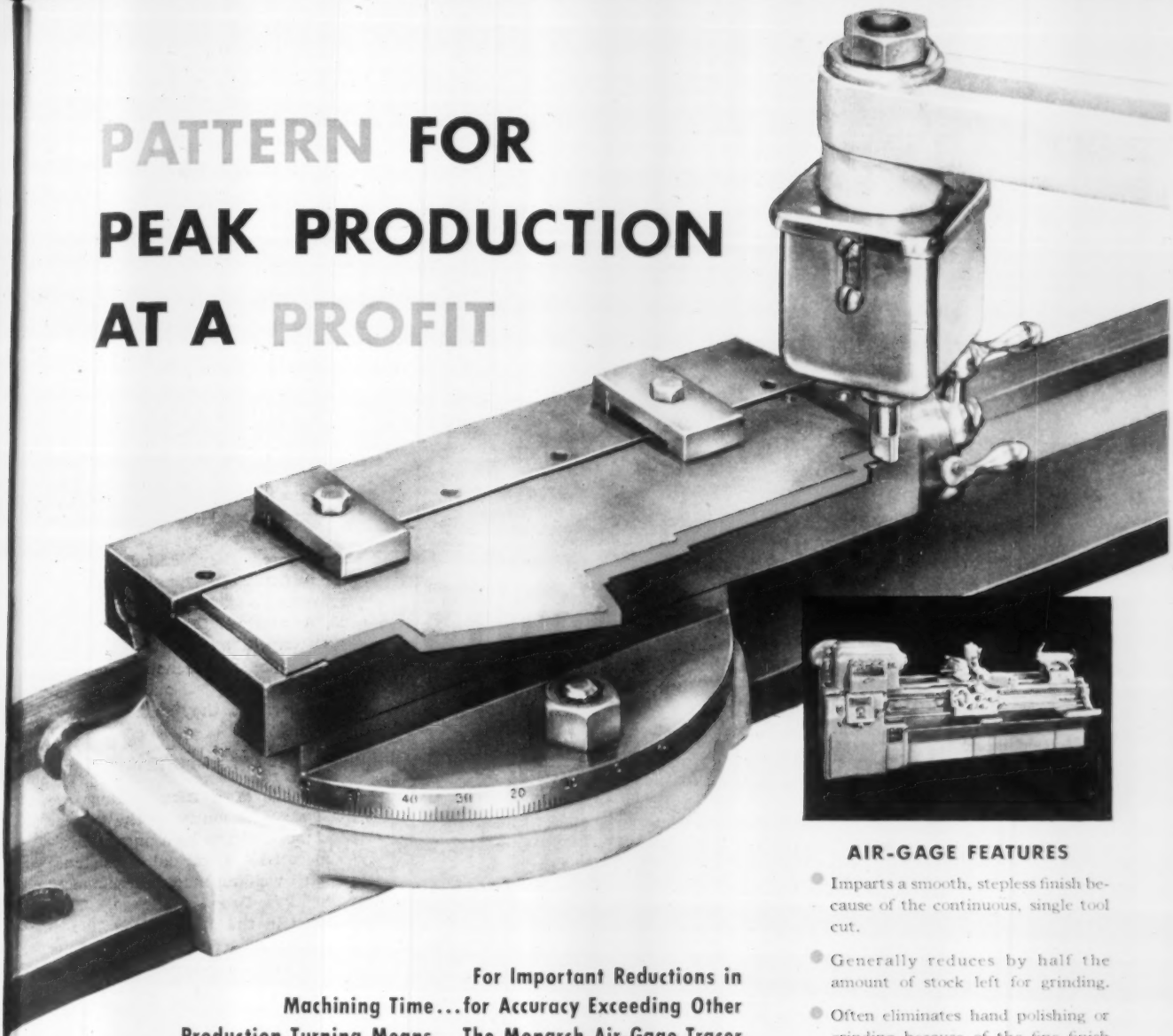
An external pump supplies the oil through recessed pads in the bearing surfaces. This same principle of bearing design enables the Mt. Palomar telescope, weighing more than 1 million pounds, to be moved around its track with only a 1/12th horsepower motor.

Principal Gains—Two main advantages of the new dynamometer bearing design are: No friction occurs to cause errors in measuring engine torque, the rotary force or twist of an automotive engine shaft which produces the engine's power output. Fretting corrosion is eliminated.

Engineers define fretting corrosion as pitting or surface damage which occurs to the ball bearing mounts of standard dynamometers. The corrosion results from the fact that the bearings move only in a restricted area under heavy loads. It contributes to faulty measurements of engine torque.

Honest Weight, No Springs — Mr. Smith and Mr. Bidwell also reported a new hydraulic weighing system for

PATTERN FOR PEAK PRODUCTION AT A PROFIT



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Look it over! Monarch's 21 years of experience with tracer controls brings you today's Monarch Air-Gage Tracer with every one of these performance features (right). Here is a simple, cost-reducing production method for turning machines. It is recommended for turning multiple diameter shafts and turning, boring or facing contours with a versatility adaptable to a large variety of turning operations. It provides accuracy far exceeding any other lathe duplicating method.

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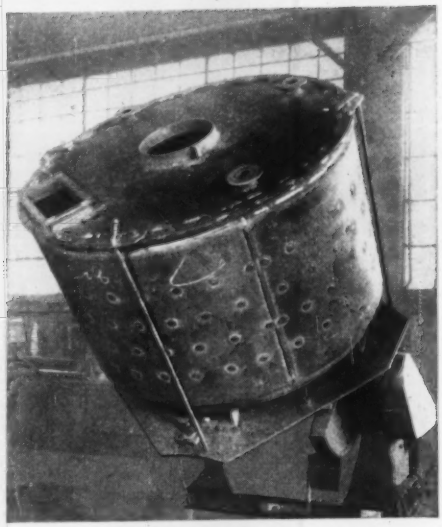

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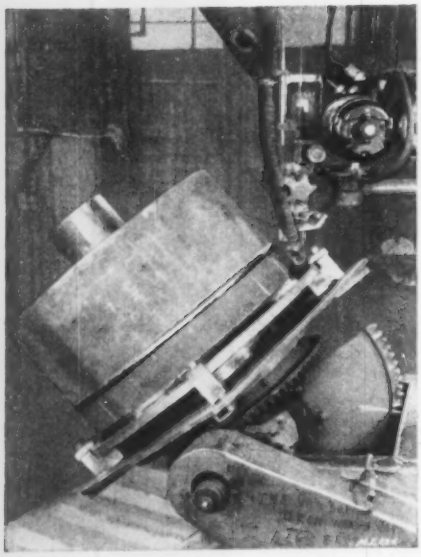

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Send For
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Profusely illustrated; describes the many advantages of Weldments, and Van Dorn's extensive facilities.

measuring torque in their improved dynamometer installations. The new system measures engine torque by means of fluid pressure instead of weights and springs of mechanical weighing scales.

Main advantage of the hydraulic system in auto engine testing, they explain, is that it eliminates mechanical parts which eventually become inaccurate from wear. It also can be set up so that the torque reading indicator can be mounted at any convenient place on the dynamometer apparatus. This was not possible with the mechanical scale measuring device. Cumulative effect of these dynamometer improvements are particularly important in studies of auto engine friction when the engine operates under road load at moderate speeds.

Heretofore, they added, it has been difficult to obtain accurate measurements at such low speeds and loads. Accurate data under these operating conditions are important in checking the fuel economy and mechanical efficiency of automotive engines under test, they said.

Flash-Butt Welds Furniture

Both ends of a tubular rung are welded simultaneously to the tubular legs of metal chairs by a pneumatically operated, electrical resistance flash-butt welding machine announced by Sciaky Bros., Chicago. Time consumed in the operation is 10 seconds and 300 complete chairs per hour is an approximate production rate. Known as the BMFU-75 this machine is rated at 75 kva and is operated on 220 or 440 v, single phase 60 cycle power supply.

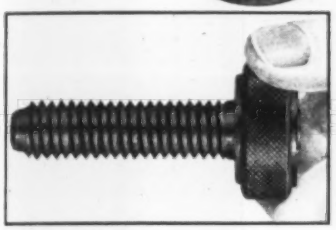
Flashing and upsetting are automatically accomplished by a gear and rack mechanism connecting the right and left platens. Platen travel during the upset stroke can be adjusted to insure strong welds with a smooth surface which does not require grinding prior to painting.

Micro-Fog Lubricates

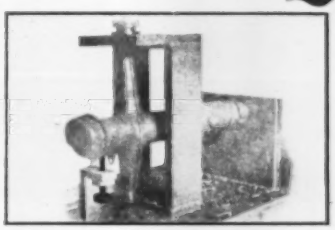
An automatic micro-fog lubricator developed by C. A. Norgren Co., Denver, creates an oil particle fog 2 microns or less in diameter. It solves difficult lubrication problems by creating a fog that remains in suspension longer; may be carried greater distances; provides more uniform distribution; does a thorough lubrication job on close-fitting parts; requires less airflow; reduces oil flooding; provides precision flow control. Reclassification of fine oil particles at point of application makes the fog wettable.

How to Increase PRODUCTION
(And Reduce Parts Rejects)

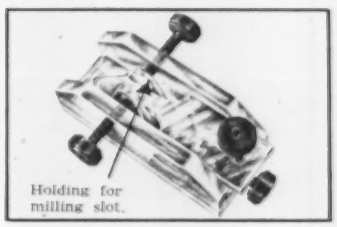
...Use VLIER TORQUE THUMB SCREWS



VLIER Torque Thumb Screws are holding tools that *automatically* prevent distortion of work pieces due to over-tightening.



VLIER Torque Thumb Screws firmly support work pieces against drill or mill thrust as shown.



VLIER Torque Thumb Screws quickly provide accurate holding pressures—save time in changing work pieces.

As shown above, VLIER torque thumb screws are simplicity in themselves . . nothing to wear out or cause production stoppages. The spring-controlled ball check *automatically* prevents over-tightening without any attention on the part of the machine operator. *Absolute uniformity of product is guaranteed!* Choose the torque thumb screws you need from the many types available.

REGULAR, Type A — for general use

Item No.	Size	Overall Length	Head Dia. & Width	End pressure in lbs.
T-100	6 x 1¼	1 11/16"	7/8" dia. x 7/16"	10 to 12
T-101	8 x 1¼	1 11/16"	7/8" dia. x 7/16"	10 to 12
T-102	10 x 1¼	1 11/16"	7/8" dia. x 7/16"	10 to 12
T-103	¼ x 1¾	2 3/16"	7/8" dia. x 7/16"	12 to 14
T-104	3/8 x 1¾	2¼"	1⅛" dia. x ½	16 to 18
T-105	3/8 x 3	3½"	1⅛" dia. x ½	16 to 18
T-106	½ x 1¾	2¼"	1⅛" dia. x ½	18 to 20
T-107	½ x 3	3½"	1⅛" dia. x ½	18 to 20
T-108	5/8 x 1¾	2¼"	1⅛" dia. x ½	20 to 22
T-109	5/8 x 3	3½"	1⅛" dia. x ½	20 to 22

INVERTED, Type B — supports work on opposite end

Item No. & Size		End Pressure (lbs.)
T-125	¼ x 1¾	12 to 14
T-126	3/8 x 1¾	16 to 18
T-127	½ x 1¾	18 to 20
T-128	5/8 x 1¾	20 to 22

TEEHEAD, Type C — for use with sliding V-blocks

Item No. & Size		End Pressure (lbs.)
T-150	¼ x 1¾	18 to 20
T-151	3/8 x 1¾	24 to 26
T-152	½ x 1¾	26 to 28

Also available in adjustable type where you set your own holding pressure.

Other VLIER products include:

SPRING PLUNGERS

Available in 11 sizes. Used for positioning, or wherever spring tension is desired.

SPRING STOPS

Designed for quickly positioning work pieces and providing 14 or 32 lbs. spring holding tension.

FIXTURE KEYS

Amazing timesavers. Allow work change-overs with practically no "down time."

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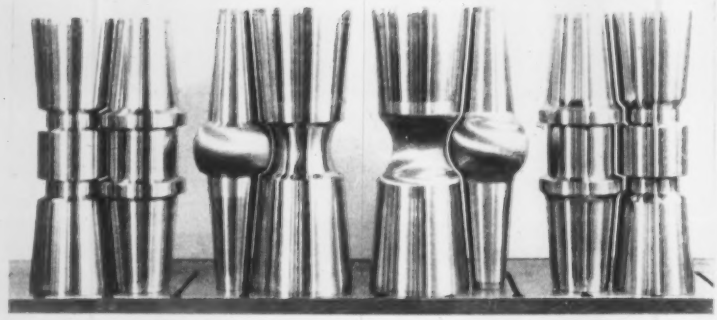

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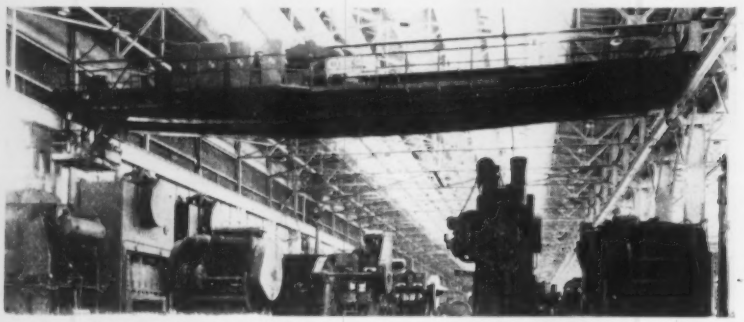

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Cobalt—Aids Metals Study

Armour researchers convert abandoned garage into radiographic laboratory

HIDDEN flaws in metal castings, welds and soldered joints are being detected by Armour Research Foundation, Illinois Institute of Technology, Chicago, using radioactive cobalt-60. The foundation converted an abandoned garage into a modern radiographic laboratory by taking advantage of the structure's geometry and utilizing a grease pit located in the center of the floor for the storage of radioactive material.

A lead safe containing one curie of cobalt-60 is placed in the pit. The

cobalt, furnished by the Oak Ridge National Laboratories, is sealed in a brass cylinder ½-inch in diameter and ¾-inch long. Three pieces of cobalt wire, contained in the cylinder are each ⅛-inch in diameter and ¾-inch long. Individually the sections have an activity of about 350 millicuries. Penetration power of the cobalt is similar to 1.8 grams of radium that sells for about $20,000 per gram.

No Hands, No Hooks—The brass cylinder is in a thin aluminum shell which has a steel ring attached to the upper end. A conical plug in the lead safe has a magnet on lower end to which the source in its aluminum container is attached magnetically. Source is raised from the lead safe at the bottom of the grease pit to a point about 3 feet above the garage floor by a light hoist operated electrically from behind protective shielding. Microswitches are preset to position the source and to indicate by warning lights that the source is out of its container and that a dan-

gerous condition exists in the room. Safety for personnel is provided by judicious use of protective time factors, distance and concrete shielding to prevent serious overexposure to the radiation.

After setting up the material to be radiographed the operator retires behind the protective wall made from commercially available, solid concrete blocks. From behind the wall operator throws a switch that actuates the raising mechanism. Periscope permits him to observe positioning of the source. Monitors in the operator's room indicate the level of radiation at all times. This level is held to well below 50 milliroentgens per 8-hour day.

Saves Equipment — Shadowgrams of subject material are recorded on photographic film placed between two sheets of lead. These exposures frequently require as much as 48 hours.

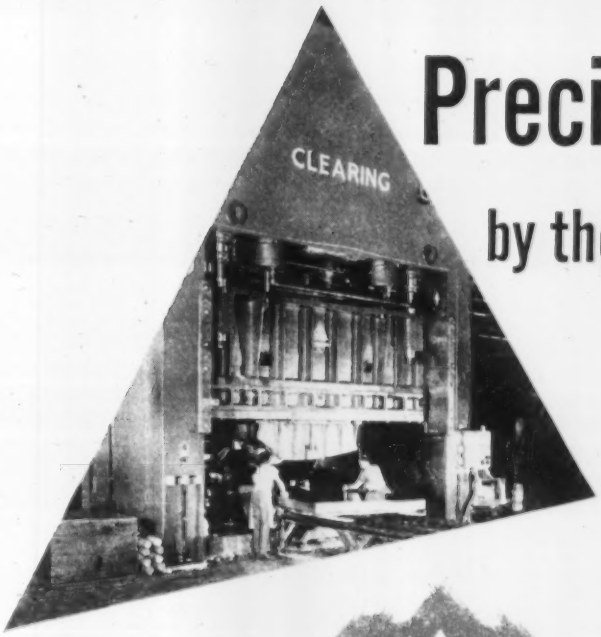
Advantage of the small but powerful source is that it eliminates large amounts of equipment normally required for radiographic work and permits taking radiographs from hard to reach places such as the inside of a curved pipe.

After the exposure is complete the cobalt-60 is lowered into the pit and the resulting film is developed. It is planned to use the safe side of the wall as a hot laboratory for handling radioactive materials prior to using them in various types of research. In this way the cold area where precise measurements are made will not become contaminated by the handling of these materials in the make ready stages of the work.

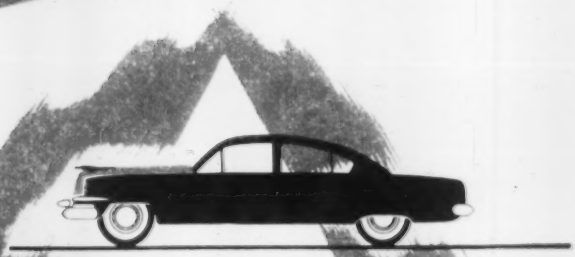
Custom Steel Parts Information

A booklet explaining the set up of the custom steel parts plant operated by Henry Disston & Sons Inc., Philadelphia, and its varied facilities for furnishing flat steel products to customers' exact specifications is available from the company. It gives the story of Disston's know-how in the steel specialties field plus its steel manufacturing experience dating back nearly a century.

Products of the custom parts plant are outlined: Circular work, rectangular work, odd shapes and intricate designs. There is also a technical description of a number of unusual problems presented to the company and how they were solved. Booklet will be of special interest to design engineers, production men, purchasing agents and others since most replaceable flat steel parts requiring hardening, tempering and machining



Precision by the ton



An automobile hood is not only a fairly large stamping, but because it is seriously unbalanced in shape from front to back, dies have a tendency to rock as pressure is applied. The big 4-point, 1500-ton capacity Clearing in this picture, at the Kaiser-Frazer Willow Run plant, is turning out this job in ideal fashion. The multiple suspension, plus the Clearing crankless principle and generous gibbing, keeps the dies true despite severe load unbalance. That means long die life and few production interruptions. If you're interested in the details, we'll be glad to supply them.

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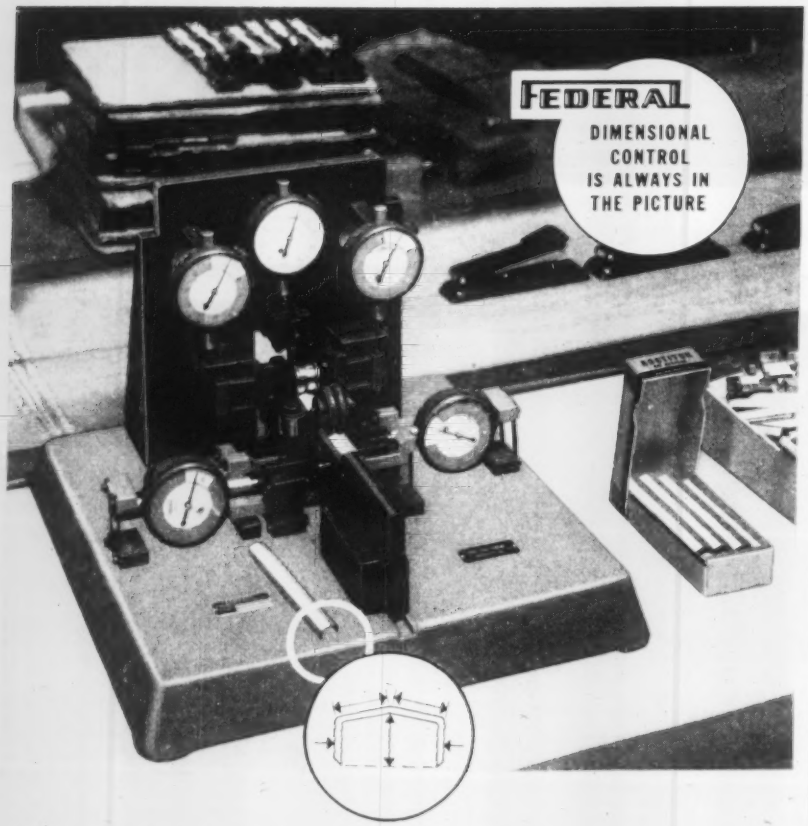

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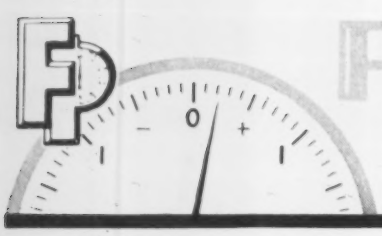
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Largest manufacturer devoted exclusively to designing and manufacturing all types of DIMENSIONAL INDICATING GAGES.

to close tolerances can be turned out by this plant. Practical advice is given on how to order custom steel parts—how many blueprints, what they should indicate, samples, dimensions, use to which part is to be put, etc.

Alloy Developed for Varied Uses

A metal suitable for dry bearings, high precision castings, fluxless welding and for dissipating heat from other metals in contact with it bears the name Chemalloy. It is produced by a special technique that permits mixing a wet mass with a molten metal without explosion using a technique owned by Chemalloy Association of San Diego, Calif. This method changes the molecular structure and permits retention of the changed chemical properties. In the midwestern and eastern states the metal is handled by Transport Products Corp., Louisville.

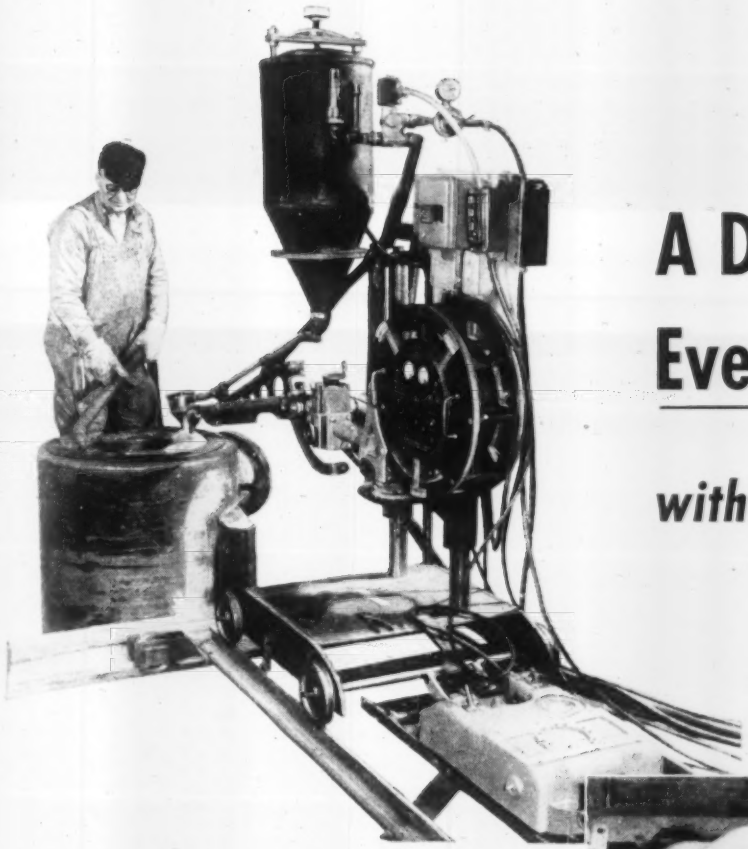
Metal has a fine grain structure, strength, a high degree of freedom from corrosion and has a natural polish as soon as a cutting tool passes over it for the first time. Composition consists of pot metal, manganese bronze, solder and a reverberatory slag that serves as the chemical carrier.

Chemicals are muriatic acid, sulphur and a special charcoal. Dirt, grit, abrasives and steel chips will not seize but instead will cut fine grooves and wear away slowly. Metal has inherent lubricating qualities enabling it to be used dry or with either oil or water as a lubricant. It can withstand a salt spray for about 15 hours without visible effect and only a slight effect is detectable after 12 hours.

Chemalloy may be produced from either reclaimed or scrap metal and from virgin metal. Sample material has been produced from melted carburetors, fuel pumps, car grilles and other parts found in automotive scrap yards.

Cosmoline Is Wronged

Occasional derogatory references to heavy grease-type metal preservatives used on various types of small arms and other military equipment under the generic term "cosmoline" have moved E. F. Houghton & Co., Philadelphia, to point out emphatically that Cosmoline has been the company's registered trademark for rust preventives since 1881. It covers a series of branded products which include, in addition to the heavy inhibited petrolatum types conforming to USA 2-82C and 2-84B, a variety of thin film resin-solvent types, polar

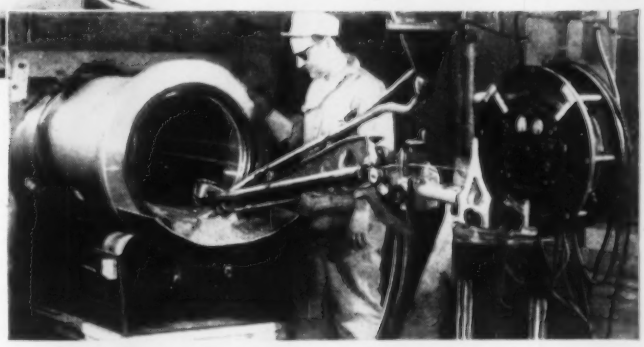


A Day's Output Every Hour

with UNIONMELT Welding
Trade-Mark

(*Above*) UNIONMELT welding a chromium alloy end ring to a mild steel pump shell takes only 1 hour and 23 minutes. Former methods of welding took 10 hours. Ring and shell, each 4 in. thick, are joined in consecutive passes as the work rotates under the UNIONMELT welding head.

(*Right*) This UNIONMELT welding machine smoothly deposits a sound, corrosion-resistant overlay inside a mild steel pump shell. Stainless steel metal — 20 to 120 lb. of it, depending on pump size — builds up at 20 lb. per hour. Highest former rate was 2 lb. per hour.



In making high-pressure steam pumps, these two welding operations used to take 20 hours—2½ working days. This was cut to 2½ hours by UNIONMELT welding as shown above. In addition, finishing costs dropped sharply because the UNIONMELT deposits are smoother and need less machining.

High-speed production is common wherever automatic UNIONMELT welding is used to join ferrous or non-ferrous metals. Welds up to 3 in. thick can be made in one pass; light-gage sheet can be welded at speeds up to 200 in. per minute.

UNIONMELT welding is only one of many time- and money-saving LINDE methods for making, cutting, joining, treating, and forming metals. So, whatever you do with metals, there is a good chance that LINDE know-how, show-how, and equipment can help you do it better, more quickly, or at lower cost. Telephone or write to our nearest office today. LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. Offices in Other Principal Cities. In Canada: Dominion Oxygen Company, Limited, Toronto.

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SPECIAL ANALYSIS WIRE. SETTING NEW STANDARDS OF PERFORMANCE
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types, inhibited lubricating oils, waxy film and water-soluble grease types.

GIs of two world wars apparently must be given the blame for the loose identification of the sticky preservative which required so much muscle and invective to remove. At the suggestion of Houghton Vice President D. J. Richards, it will henceforth be called what it really is—heavy grease.

Ultrasonic Testing Reviewed

Ten technical papers and discussions included in a symposium on ultrasonic testing represent a summary of the history, theoretical aspects, basic principles of practical testing, and practical applications for the ultrasonic testing of materials as presented at sessions on the subject, sponsored by committee E-7 on nondestructive testing, at the recent annual meeting of the American Society for Testing Materials.

The papers, now assembled in booklet form, have been reviewed prior to publication by their authors in the light of latest developments and provide a wealth of up-to-date pertinent and valuable information. In his introduction, H. C. Amtsberg, Westinghouse Electric Corp., indicates these points: (1) Ultrasonic testing is being used extensively today; (2) it is practical and is being applied intelligently by engineers in all branches and in a variety of industries; (3) it is not just another device which can be used for rejecting more material; (4) standard equipment is available which will perform acceptably in the hands of non-technically trained personnel of ordinary skill.

Several of the papers include appropriate lists of references and one bibliography is exceptional, constituting 342 references to the inspection, processing and manufacturing control of metals by ultrasonic methods. This paper, by C. H. Hastings and S. W. Carter, is a summary of available technical literature through 1946.

Copies of this illustrated 140-page *Symposium on Ultrasonic Testing* can be obtained from American Society for Testing Materials, 1916 Race St., Philadelphia 3, at $2 each.

Rust Preventives Removed

A useful booklet on machinery cleaning, rust inhibiting and the removal of rust preventive coatings is offered by DuBois Co., Cincinnati. Some of the featured operations are cleaning of stationary machinery, motors, bearings and other machine parts. Several rust-inhibiting, and

dual cleaning with rust-inhibiting operations are illustrated. A bulletin on the removal of rust-preventive coating from machinery, equipment and tools is included for industries now expanding and retooling for the defense effort.

Jet Alloys Enter Crucial Phase

Immediate battle of finding steel alloys to withstand terrific temperatures for use in jet and rocket machines is entering its most crucial phase, says the American Iron & Steel Institute in its publication *Steelways*. Skillfully blended steel strengthening metals are now available, a few years ago they were still in the laboratory. In a mounting drive to find still tougher steel for longer lasting and faster jets and rockets more than 1000 alloys were studied and tested.

Engineers want jet turbine steels to take 300 degrees more than they now serve. This jump is serious and difficult. One method of strengthening steel is covering it with a coating substance. Protective substances have been found and are being tested on ramjets and 1000 mile an hour and more aerial torpedoes. Some metals that go to these uses will take heat somewhere between 2000 and 3000°F. Their life, however, is only a few hours.

Clean Castings Quicker

Installation of two Pangborn airless centrifugal blast cleaning machines at Yates-American Machine Co., Beloit, Wis., has resulted in lower cleaning costs for castings under 1500 pounds. A turn-table type machine for normal work and a 7-foot Rotoblast rocker barrel which handles small parts comprise the cleaning installation.

Castings are cleaned more rapidly and thoroughly, and grinding time is reduced. This method allows more efficient inspection, and maintenance costs are cut. The high quality of cleaning results in greater production by reducing the handling necessary to clean the castings properly.

Air Force Packaging Standards

Industry and the Air Force are teaming up to establish standard unit packaging for Air Force supply items. In addition to standardization of unit package quantities the program also prescribes the method of preservation required for packaging an item in a standard unit package and determines the weight, cubage and dimensions of a standard unit package. Data compiled is being included in

Murphy Paint Co., Ltd., subsidiary of Pittsburgh Plate Glass Co.

You can total profits NOW with INVESTMENT PROTECTION!

Here's another case history on the advantages of *Automatic Sprinklers* . . . further proof that profits can be totaled NOW with INVESTMENT PROTECTION. Representing a property valuation of over $1,500,000, the Toronto plant of Murphy Paint Company, Ltd., is a perfect example of modern thinking from a construction point of view. That same thinking held sway when it came to the selection of fire protective equipment for the safety of lives and the preservation of property. *Automatic Sprinklers*, on their record of performance, were the management's choice.

But savings are also of important concern to Murphy Paint and they report, that in their case, *Automatic Sprinklers* will pay for themselves through reduced insurance rates in about five years. That's INVESTMENT PROTECTION, considerably less costly than would be fire destruction. It's substantial reason why executives in all types of business are specifying *Automatic Sprinklers* for both old and new construction. They've made them their first line of fire defense and, ***you should too.*** *They're an important investment today . . . perhaps welcomed protection tomorrow.*

"AUTOMATIC" SPRINKLER CORPORATION OF AMERICA
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Typical "Automatic" Sprinkler protected properties include: Industrial Plants, Storage-Warehousing, Mercantiles, Piers-Wharves, Aviation Properties, Hospitals-Institutions, Hotels, Schools-Colleges, Offices, Public Buildings and many other types of occupancies.

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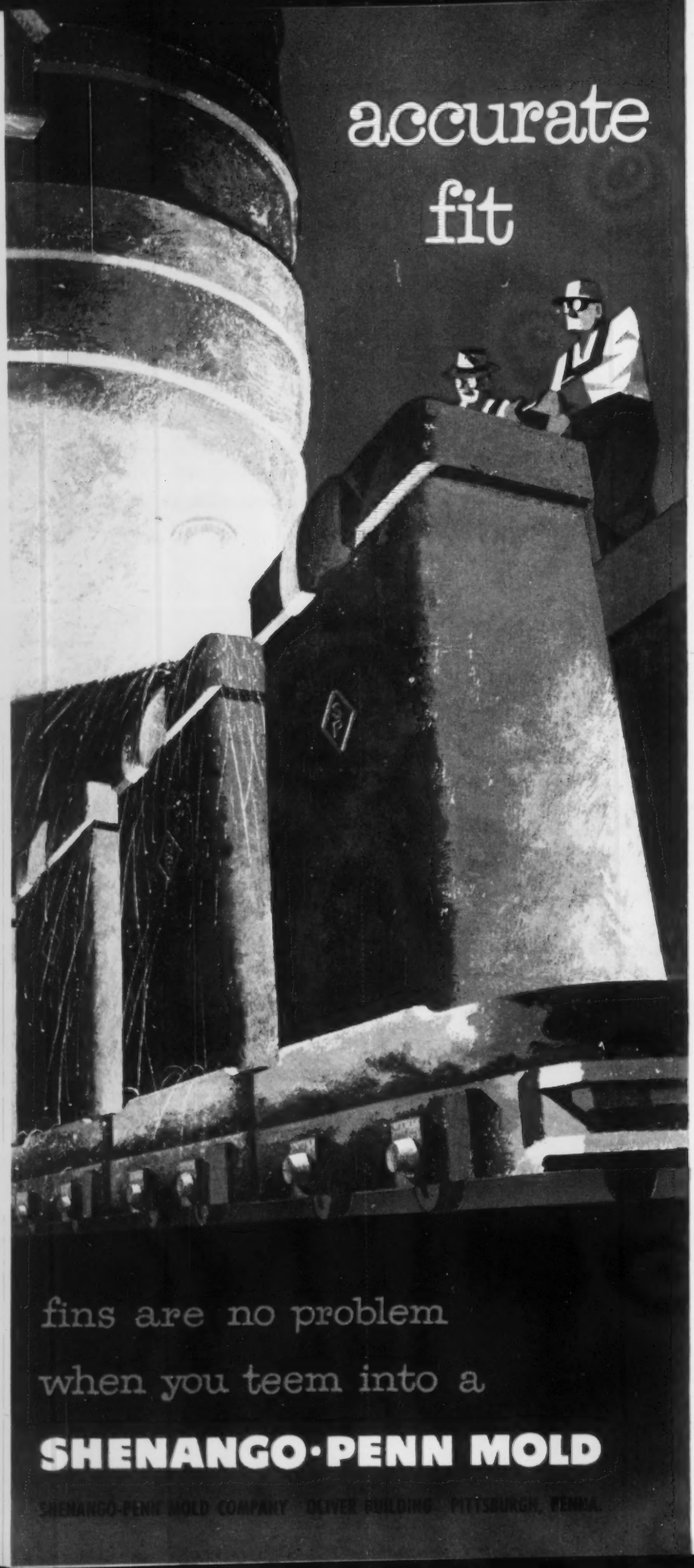

a publication "USAF Unit Package, Weight and Cubage Data."

Supply Division, Air Materiel Command, is carrying on the weight and cubage project which is about 75 per cent completed. Project enables the Supply Division to prescribe adequate unit packages for all active Air Force supply items, preventing utilization of oversize containers and improper preservation. Some 400,000 supply items are included in the entire study.

Report Lists Weight Formulas

Designers of aircraft electrical equipment can use weight determining formulas for direct current generators contained in a report available from Office of Technical Services, Commerce Department, Washington, for $2. Report was prepared by the Naval Research Laboratory and summarizes investigation of the relationships between total generator weight and power output at minimum rotor speed. Empirical equations were developed for output voltages from 30 to 120 volts, load currents from 100 to 400 amperes and minimum rotor speeds of 3000 to 8000 rpm. Report suggests that same method can be used to derive equations based on different assumptions.

A conclusion of the study is that for low ratings of power output per minimum speed the 30-volt generators will weigh less than the 120-volt units. The opposite is felt to be true for high rating of power output per minimum speed.

Aluminum Bridge Railings

Engineering manual for aluminum bridge railings containing stress analysis data, cost structure, design details, assembly methods, surface treatment is offered by Reynolds Metals Co., Louisville. Bridge railings constitute a new application for aluminum; very little technical information is available. Manual analyzes advantages of aluminum for this service and presents typical designs to show the possibilities in this application.

Robot Operations Traced

Comprehensive coverage of modern automatic operating equipment for doors and gates is contained in literature available from Robot Appliances Inc., Dearborn, Mich. Descriptive and explanatory text plus free use of pictures and diagrams shows what has been done in this field in the last 20 years and what makes these devices constantly more neces-

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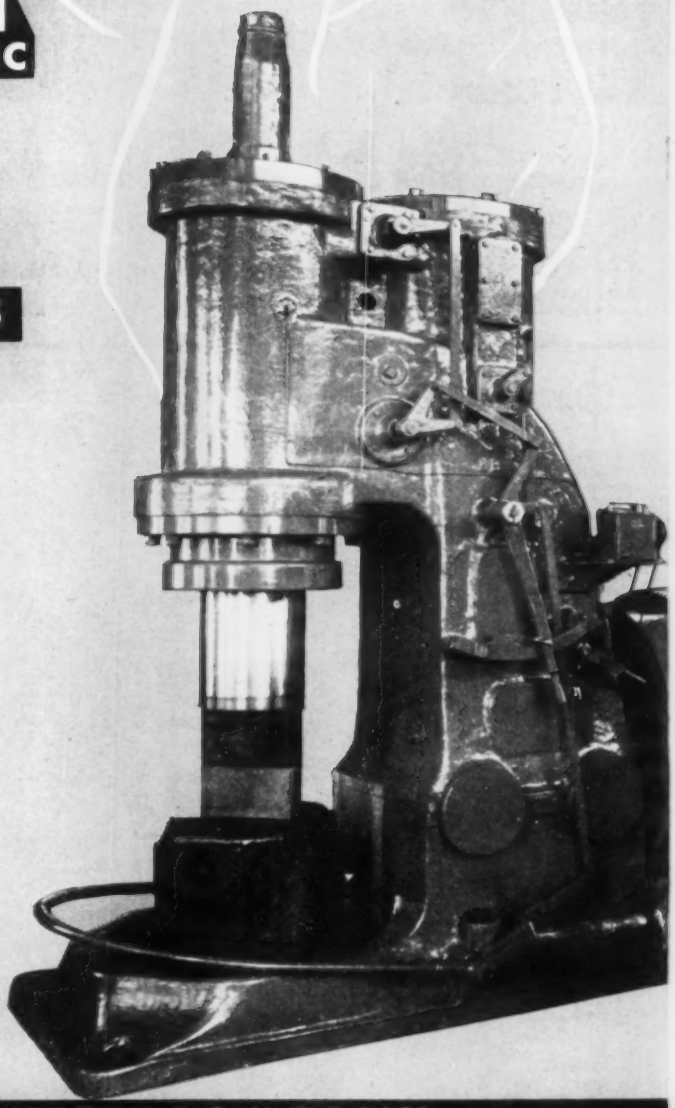
Completely self-contained, the NAZEL is always ready to go. It eliminates boiler maintenance and operating costs, piping and compressor upkeep. And, because the NAZEL consumes power only when in use and requires only one man to operate, it materially reduces forging costs, too. Write for your copy of the Hammer Book, today.



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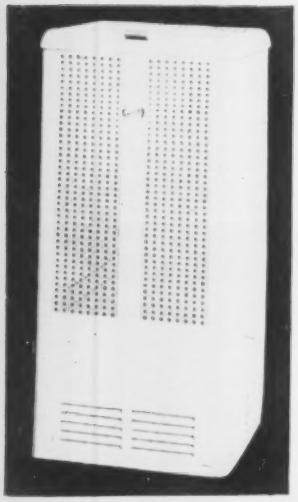
Hendrick Ornametal

TRADE MARK



Hendrick Ornametal is a decorative, lightweight metal grille suitable for a wide variety of applications, such as for stove panels as shown in the illustration.

Furnished in a wide variety of attractive designs, Ornametal is made of a special bright finish, cold rolled steel, suitable for painting or plating, and is available in a wide range of stock size sheets and gauges. Write for full information.

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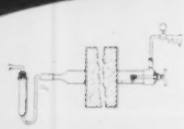

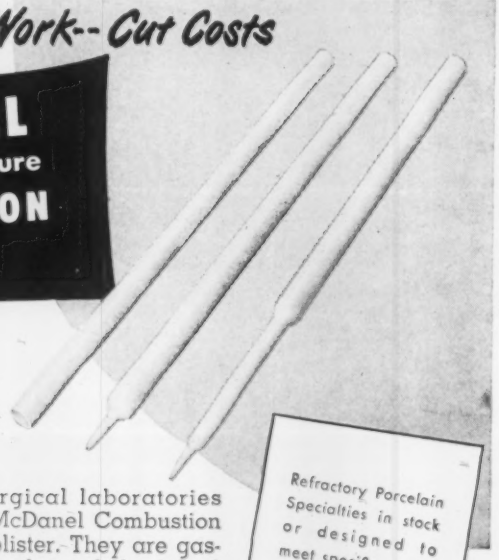

Favorites in metallurgical laboratories throughout America, McDanel Combustion Tubes never spall or blister. They are gas-tight, highly resistant to thermal shock and precision made in every detail. Carbon and sulphur determination work goes smoothly with McDanel Tubes — and control costs are kept at lowest level.

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"McDanel Industrial Porcelains"

Refractory Porcelain Specialties in stock or designed to meet specific needs. Flasks, retorts, crucibles, etc. and parts "custom-made" to do the job.

McDANEL REFRACTORY PORCELAIN CO.
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sary to modern living and working. Advantages include: Safety, dependability, savings in time and health, economy and convenience.

Truck Maintenance Needs Plan

Ways to lower operating costs of electric industrial trucks are outlined by Charles Greener, general service manager, Automatic Transportation Co., Chicago. Planned preventive maintenance assures reduced service budgets, longer truck life and less down time while trucks undergo repairs, he says. His program for one truck or fleet operations, based on studies of successful techniques includes:

Teaching operators that truck capacity varies with load length and that continual overloading causes serious breakdowns and plays havoc with tire bills. Floors must be kept clean and in good condition to ease damaging strains and shocks. Tires should be replaced when they develop flat spots or when big chunks of rubber are gouged out as stretching tire use costs more in repairs than can possibly be saved. Let mechanics do repair work, when something goes wrong have the operator call the mechanic and don't let the truck be pushed or towed without the mechanic's orders. Train operators to use assigned equipment properly, using permanent truck assignments wherever it is possible.

Get full information about a new truck by having a manufacturer's service representative demonstrate it for operators and instruct maintenance force.

Mechanical maintenance program should follow a regular schedule complete with a fleet maintenance record. A monthly lubrication and maintenance check should follow removal of dirt and grit from the undercarriage. Semiannual mechanical checks and lubrication must be more extensive, including repacking wheel bearings, changing drive axle grease or oil and other services not assigned to short term checks. Electrical checks should be conducted on a weekly, monthly and semiannual basis.

Batteries require care especially to avoid overwatering. Automatic charging equipment must be properly maintained. A weekly log should be permanently maintained for each truck.

Cutting and Grinding Facts Give

Factual data concerning more than 50 typical metalworking jobs is presented in Sun Oil Co.'s booklet

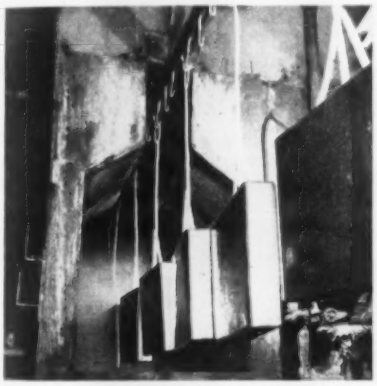
...tting and Grinding Facts." By comparing their own operations with those outlined, production executives may be able to find ways to speed production, improve finishes and prolong tool life.

Much of the operational data is based on latest information supplied by builders of automatics, grinders, lathes, millers and other machine tools.

The booklet presents descriptions of Sun's straight and emulsified cutting oils plus a chart showing the correct cutting fluids for many of the most frequently used metals and machines. Copies of the booklet can be obtained by addressing a request on company letterhead to Sun Oil Co., 1608 Walnut St., Philadelphia 3.

Paint Failures Cleaned Away

Paint failures on the Ironrite ironer made by Ironrite Inc., Mt. Clemens, Mich., are reduced to a minimum by a phosphating cleaner that cleans metal and deposits a tight-

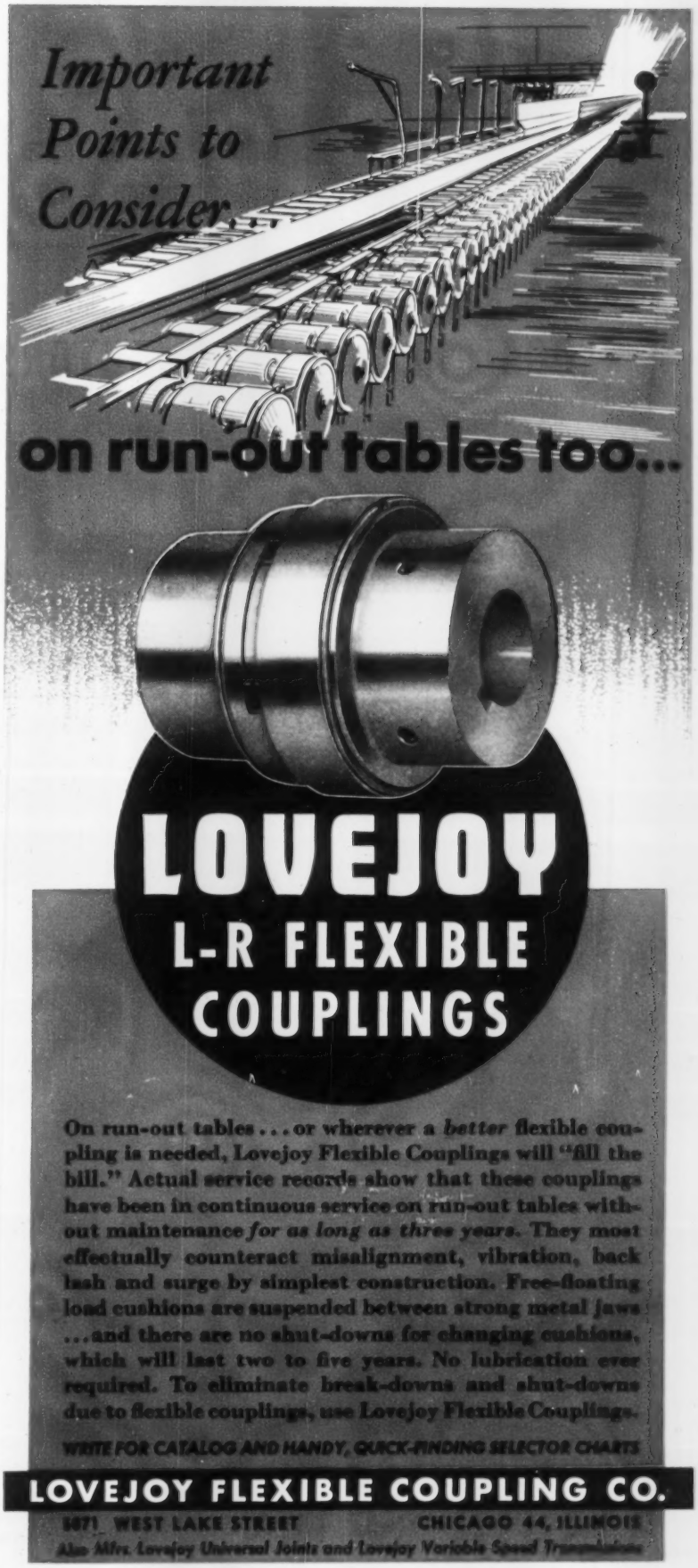


ly adherent phosphate coating at the same time.

Phosphate coating not only retards rust but provides an excellent bond for industrial finishes, says Bert Doggett, paint superintendent for the appliance manufacturer.

Cleaning and conditioning material employed is Klem Kote used in the three stage washer shown in the photograph. After metal is cleaned and coated it is given a hot water rinse and is finally rinsed with Tacomite (chromic phosphoric rinse). Another advantage of the chemicals used is that they are not critical and don't break down at temperatures ranging from 170 to 180° F in the washer.

Chemical consumption is half as large as in the former, more complex rustproofing process. Since more than 5000 painted pieces are processed per day the savings are substantial. Klem Kote is used in concentrations of one to two ounces per gallon of water. It is nontoxic, non-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L-R FLEXIBLE COUPLINGS
On run-out tables . . . or wherever a better flexible coupling is needed, Lovejoy Flexible Couplings will "fill the bill." Actual service records show that these couplings have been in continuous service on run-out tables without maintenance for as long as three years. They most effectually counteract misalignment, vibration, back lash and surge by simplest construction. Free-floating load cushions are suspended between strong metal jaws . . . and there are no shut-downs for changing cushions, which will last two to five years. No lubrication ever required. To eliminate break-downs and shut-downs due to flexible couplings, use Lovejoy Flexible Couplings.
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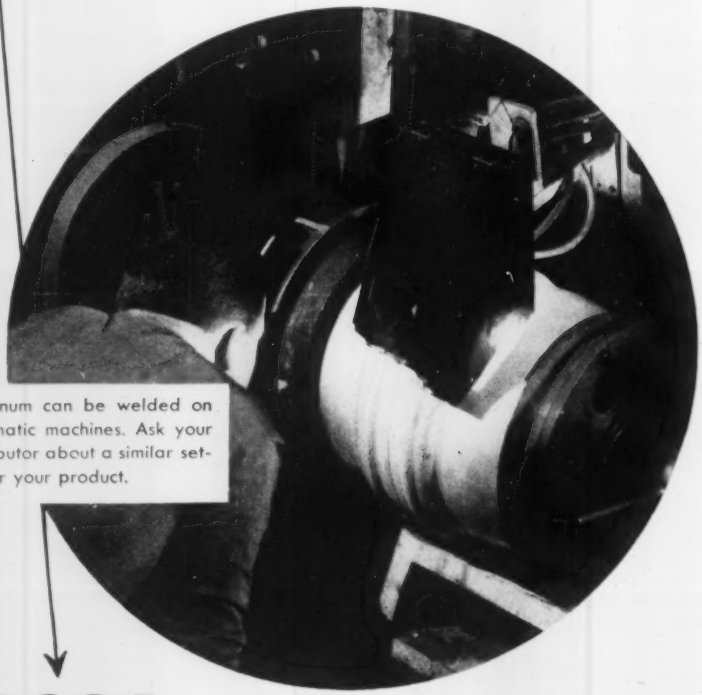
For group instruction in brazing or welding aluminum, there's nothing like Alcoa's technical library . . . 4 how-to-do-it motion pictures plus a 186-page book. Ask your Alcoa Distributor about them. You'll find him listed under "aluminum" in your classified phone book.

Or write ALUMINUM COMPANY OF AMERICA, 1942C Gulf Bldg., Pittsburgh 19, Pennsylvania.



Aluminum can be welded on automatic machines. Ask your distributor about a similar set-up for your product.

ALCOA FIRST IN ALUMINUM

fuming and requires no special care in handling.

It normally takes 1 minute for the washing process but when surface rust is apparent the time is increased to 4 or 5 minutes. Rust spots may still be visible but experience in the reduction of paint failures indicates they have been passivated.
Cut 18 ems high.

Dynaflow Drive Increases Efficiency of Orton Crane

Merging of a combination torque converter and fluid coupling with a GM diesel engine, provides many operational advantages in the new Orton crane. It automatically provides a correct torque in the exact amount needed to move the load, eliminates "slip-clutching" at high speeds to start heavy loads, and facilitates the smooth and fast pickup of heavy loads. Other advantages include the elimination of shock loading on gears, shafts and clutches, and the creation of fewer and lighter stresses which spell reduced maintenance.

The converter acting as a hydraulic clutch allows loads to be moved up and down fractions of an inch at the will of the operator. The combination torque converter and fluid coupling, known as Dynaflow—the same type as is found in Buick automobiles—delivers smooth, uninterrupted power through liquid at all times. It is able to handle variable loads with shock-free, pin-point control not obtainable with the torque converter or the fluid coupling alone. Company engineers reveal that it is the combination of both the converter and coupling which makes such efficiency possible.

How It Works—A brief description of the principle—specifically with reference to the hovering ability or fractional-inch control of the load is as follows: When the pump throws oil into the vanes of the turbine, the speeding oil is whirled into outer channels, striking the blades to make the turbine turn. Picking up the load, however, resistance to turning offered by the turbine allows the oil to slide through, leaving the turbine through smaller openings than those through which it entered.

This oil, going faster than when it left the pump, strikes the stators which change the direction of the fluid with little loss of energy so that the oil is again traveling in the same direction as the pump. This oil reenters the pump at the hub and allows a torque multiplication of 3.6 times. As the turbine resistance decreases, oil leaves the turbine at a slower speed and torque multiplica-

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Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

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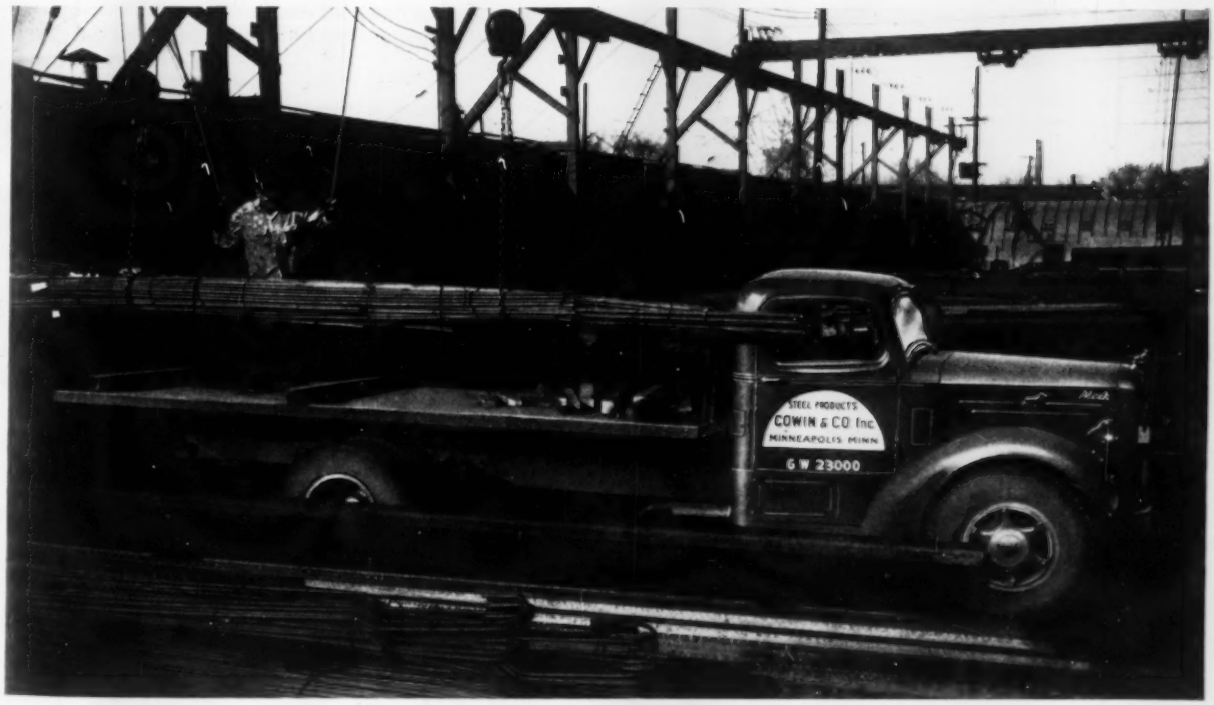

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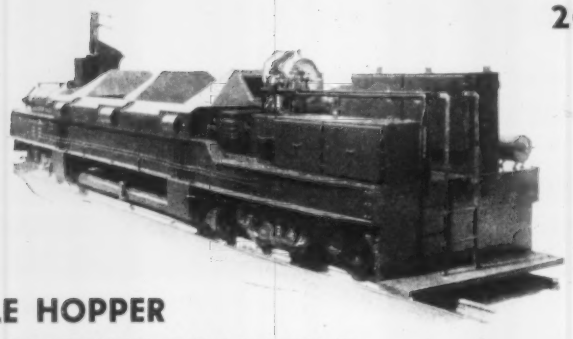

DOUBLE HOPPER
BOTTOM DUMP SCALE CAR

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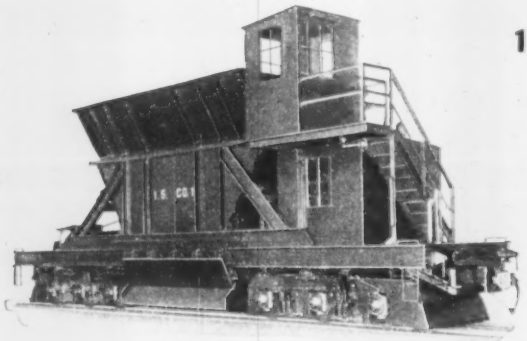
SIDE DUMP



ORE TRANSFER CAR

ATLAS BUILDS:—Scale Charging Cars and Ore Transfers: Indicating and Recording Dials for weighing scales: Electric and Storage Battery Locomotives: Coal Charging Cars: Door Extractors: Coke Quenching Cars: Turntables.

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tion drops until the unit is operating as a fluid coupling.

The drive consists essentially of a pump driven by the flywheel, a turbine splined to the power take-off shaft, and a first and second stator mounted between the pump and turbine.

Steady Does It—This new crane, according to company engineers, is particularly adaptable to jobs such as the setting of steel girders and beams, laying of track, setting of caps and trusses for pile driving work, heavy assembly work, delicate inside handling jobs and many other assembly and moving problems which require a steady positioning of the load.

Plastic Protector Developed

Development of an air-drying plastic protective coating is announced by United States Rubber Co. It is used to protect tanks, tank cars, pipes, fittings, structural steel parts and chemical processing equipment against attack by splash, drip and spray from corrosive chemicals, corrosive atmospheres, weathering and rust. Coating is in pilot production at the company's Providence, R. I., plant.

Plastic combines high film flexibility with good adhesion and impact resistance. It will not chip or crack and can be used on steel, aluminum, concrete, hardwood or composition board. It is applied by spray, allowing 1 hour drying time between coats and 24 hours drying time after the final coat. It requires no primer and can be produced in a variety of colors. Since it contains no chemical plasticizer to leech out or harden, it retains its flexibility throughout its service life.

A sharp instrument will cut through the film but the break can be repaired easily by "touching up" with brush or spray. Metal should be grit or sand-blasted before the coating is applied, cement should be etched with hydrochloric acid, while wood and composition board needs rough sanding to assure a good bond.

Pipe Making Story Told

Spang-Chalfant Division, National Supply Co., Pittsburgh, announces a 32-page bulletin, No. 370, covering its CW steel pipe and manufacture. The bulletin includes black and galvanized pipe in all standard sizes from ⅛ to 4 inches, with tables of dimensions, weights, test pressures, threading data and bundling schedules.

Modern fabrication methods and constant development and application of closer controls on the mechanized

fabricating processes are emphasized in the bulletin as the means of producing pipe with qualities beyond standard specifications. Illustrated in color, the booklet presents a picture story of the steps of manufacture from skelp through the heating furnace, the continuous welding process, and numerous finishing operations by which CW steel pipe is made.

Aluminum Creep Studied

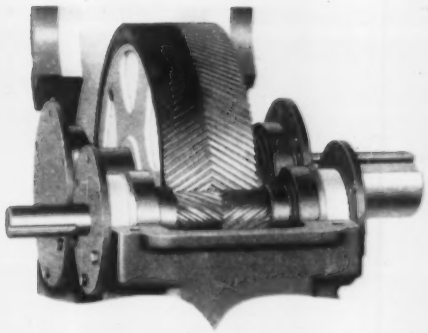
Recent investigations by W. D. Jenkins of the National Bureau of Standards have led to significant fundamental information on high-purity aluminum—specifically the effects of stress and sudden changes of temperature on creep behavior. The ability of aluminum to produce, with added elements, solid-solution alloys as well as alloys of the precipitation type makes this metal ideally suited as a basis for fundamental studies of the deformation process. Moreover, considerable interest in the behavior of aluminum alloys at elevated temperatures has been stimulated both by the needs of the aircraft industry and by the availability of aluminum and its alloys in a fairly pure state.

Bureau's study included the standard creep tests made in tension at 105° F under constant load conditions. These results were supplemented by data from interrupted tensile tests at room temperature and from other creep tests in which the test temperature was changed from 105° to 95° and back to 105° F.

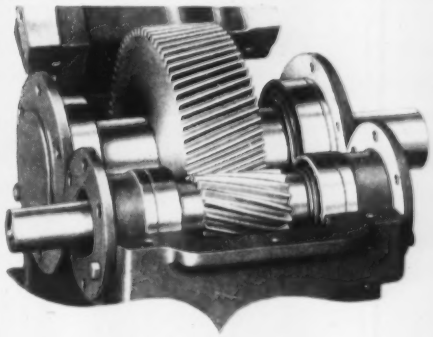
Extension-time curves for the constant load tests conformed generally to the well known patterns associated with creep; an initial extension upon application of load, a stage of decreasing rate of extension, a stage of minimum rate of extension, and a stage of increasing rate eventually leading to complete fracture. However, as was observed in previous investigations of ingot iron and copper at the bureau, the rate of change of extension with time in these tests also occurred in a discontinuous manner. The frequency and amplitude of the cycles produced are attributed to the magnitude of the stress and the thermal-mechanical history of the material. Discontinuous flow was also revealed at room temperature by serrated stress-strain curves.

A linear relationship between tensile creep stress and second stage creep rate was not found in the investigation. Rather, a sigmoidal curve was produced when these values were plotted on either a log-log or semilog basis. Extrapolations based on a linear relationship could therefore result in serious difficulties.

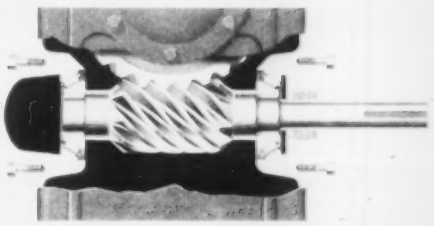
Several types of recovery (grain



A Complete Line of Speed Reducers



HERRINGBONE · HELICAL · WORM GEAR



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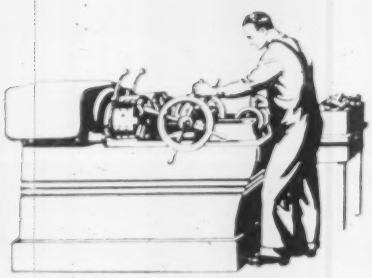
• Horsburgh & Scott Speed Reducers are available in 3 general groups, 12 distinct types in many sizes and hundreds of standard ratios. Many considerations, such as speed of driving and driven shafts, shape of housing and characteristics of drive, point definitely to one specific unit as the best drive for a particular duty. Having such a complete line to select from, engineers have exceptional freedom for unbiased selection of the right reducer for the job.

THE HORSBURGH & SCOTT CO.
GEARS AND SPEED REDUCERS
5112 HAMILTON AVE. • CLEVELAND 14, OHIO, U.S.A.

Send note on Company Letterhead for Speed Reducer Catalog 46

TIPS ON TAPPING AND THREADING TROUBLES



Page A-6

OILS FOR TAPPING AND THREADING

OILS WITH ACTIVE SULPHUR REQUIRED

Tapping and threading are difficult machining operations due primarily to limited chip room and the difficulty of maintaining sufficient lubrication at points of contact between threading tool and workpiece. Cutting oils having high sulphur activity are usually required and recommended for difficult threading and tapping work. Stuart's THREDKUT and related products, due to their high effective sulphur content, have been outstanding for this class of work. Active or effective sulphur in an oil functions as an anti-weld agent preventing pick-up of metal particles on the tool which results in scuffing and poor finishes.

RULE OF THUMB

Here is a good rule of thumb to remember when sulphurized cutting oils are being used:
When you observe excessive wear on the front clearance of cutting tools, DECREASE the amount of active sulphur in the oil by diluting with paraffin oil or other low cost blending oil. If poor finish is encountered due to welding or metal pick-up on the tool edge, INCREASE the active sulphur, or if Stuart's THREDKUT is being used, apply it straight.

DATA

RESULTS

Operation: Threading male pipe union sections on Large automatics using single point tools.
Material: Type 410 stainless steel.

	Previous Oil	Stuart's THREDKUT 9961
Oil:		
Tool Life:	136 pcs. per tool grind	310 pcs. per tool grind
Part Finish:	Fair	Excellent
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softening) were revealed by the different tests conducted during this investigation of high-purity aluminum. One type was manifested by an increase in extension at the beginning of the third stage (the region after which the average creep rate continuously increases) for a specimen tested under constant load at 105° and 95°, then at 105° F. Another type of recovery was illustrated by interrupted tensile tests in which the specimen was deformed to a predetermined strain, followed by dropping the load to zero. The tensile test was then continued to a higher strain value and the above process was repeated. Lowering of yield stress as a measure of recovery was evidenced in all the latter cases.

Structural features accompanying plastic deformation indicated that the self recovery process occurring within the individual grains was continuously changing throughout each test. Deformation in different grains was characterized by a difference in the magnitude and distribution of subcrystals and strain markings. Specimens strained at relatively fast rates showed a tendency to fracture in a transcrystalline manner. The cracks that eventually link up to form the main fracture course are initiated in the vicinity of the axis and propagate to the surface. In this way a "rim" is formed whose diameter decreases with increases in strain for any one particular specimen. Increases in creep rate tend to accentuate the formation of the rim.

Data on Welded Steel Pipe

A new data card on seamless and welded pipe of carbon, alloy and stainless steel has been drawn up by the Babcock & Wilcox Tube Co., Beaver Falls, Pa. Table I on the double card lists dimensions in 16 sizes of pipe from ⅛-inch to 8-inch nominal size, with five different weight schedules according to wall inches and inside diameter. Table II gives ASTM and ASME specifications with grades and analyses for various types of pipe for high-temperature and other services.

Tension Linkages Described

Baldwin Duckworth Division, Chain Belt Co. is making available a handbook for designers of tension linkages. As used in this book tension linkage describes any chain application in which linear movement of the chain is not continuous in direction. Predominating feature of tension linkage is that the chain need not be an endless belt as in a power transmission drive.

Numerous examples of tension link-

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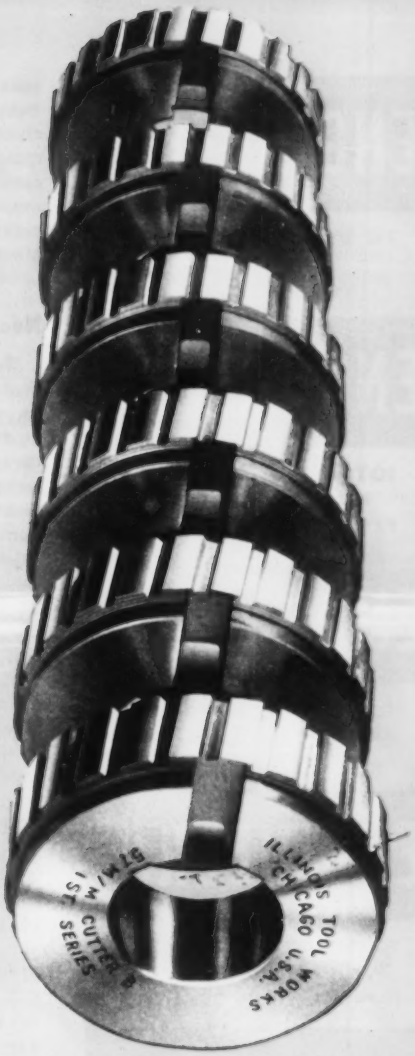

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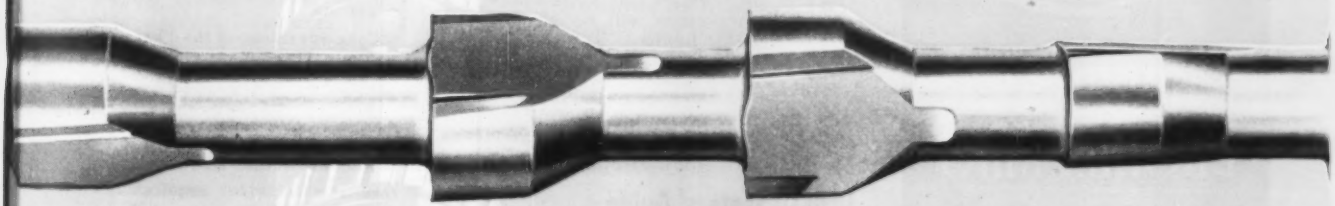

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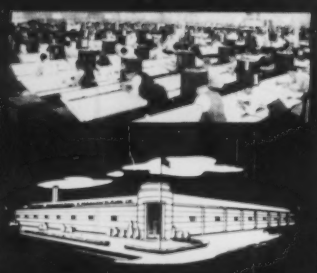

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ages are shown and described in the bulletin. Various types of roller chains used in tension linkage applications are illustrated, described and cataloged. Copies of bulletin 51-10 may be secured by writing to the company, Dept. PR, Springfield 2, Mass.

Neoprene Coating Airdries

Neoprene, the synthetic rubber made by Du Pont, can be applied as an airdry protective coating for industrial maintenance work on structural steel, concrete, wood and exterior surfaces of tanks and equipment. It is applied by brush or spray gun in a single coat 5 to 10 mils thick. Outstanding properties are those which distinguish neoprene from natural and other synthetic rubber: Exceptional resistance to oil, grease and chemicals; and resistance to age cracking by sunlight, weather and ozone. It also possesses the characteristic properties of any rubber product: Resilience, elasticity, high order of abrasion resistance, nonchipping and noncracking.

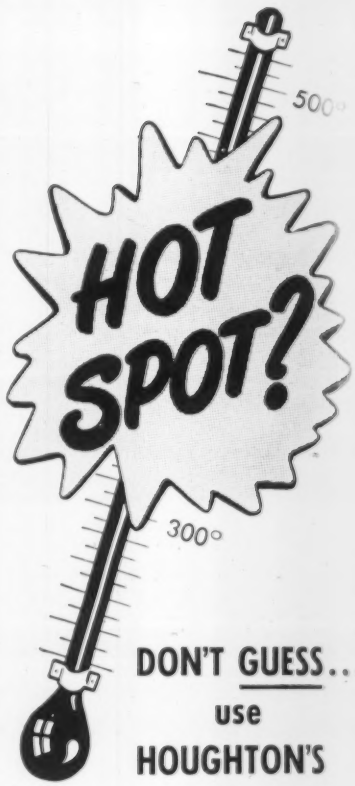
Material is produced by Gates Engineering Co., Wilmington, Del., and is named Gaco neoprene maintenance coating. It develops its desirable physical properties without benefit of heat. Coating is a solvent solution of a specially developed neoprene composition, it will not gel or set up in the container but will cure at normal temperatures after the solvent has evaporated.

Instrument Men Convene

Instrumentation for the iron and steel industry will be the subject of a two-day conference sponsored by Carnegie Institute of Technology and the Instrument Society of America. First of its type for the steel industry, the symposium will be directed to the man in industry to reveal to him how he can use instruments to improve production. The program will be presented in Pittsburgh, Mar. 28-29.

Drill Operators' Guide

Portable electric drills, how and where to use them, is the subject of a new booklet, "More Holes in a Hurry." Operations such as drilling pilot holes and concentric holes in a scribed circle, and the proper techniques for drilling various materials are discussed. Tables and charts give drill sizes and speeds. The booklet is available from Mall Tool Co., 7762 S. Chicago Ave., Chicago 19, Ill.



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New Books

Arc Welding Handbook

Procedure Handbook of Arc Welding Design and Practice; semiflexible, simulated leather cover, 1200 pages, 6 x 9 inches; published by Lincoln Electric Co., Cleveland, for $2.00, postage prepaid, in the United States; $2.50 elsewhere; available from STEEL, Penton Bldg., Cleveland 13, O.

The ninth edition of this handbook has been completely reorganized and re-edited to bring all information up to date and include recent important welding developments. It is well illustrated containing about 1300 drawings and photographs.

New design data are included to make the book more helpful to designers of welded machines and structures. Latest procedures are given for welding all metals and alloys commonly welded with manual open arc and hidden arc welding as well as automatic and semiautomatic hidden arc welding. A new chapter on weldability has been written to present a comprehensive survey of this subject and latest information gathered from research projects and recent studies give facts which have changed welding procedures on many types of metals in the last few years.

A new chapter has been added on welded design data. It presents fundamentals of welded design for both machinery and structures, such as stress allowables, which can be applied to particular design problems. This chapter gives a designer the necessary tools for approaching any problem he may have in designing for welding.

Section on structural design has been enlarged and revised to include more information on welded rigid framing. Design techniques developed by leading consulting engineers for recently erected structures are included.

The machine design section has also been enlarged to include more information on welded design of machine tools. This is in addition to design data revised for other machinery of all classifications.

Steel Casting Data

Steel Castings Handbook; semiflexible, simulated leather cover, 511 pages, 6 x 9¼ inches; published by Steel Founders' Society of America, Cleveland, for $4.00; available from STEEL, Penton Bldg., Cleveland 13, O.

Rewritten, enlarged and reorganized throughout, the 1950 edition represents a complete revision of the original volume which was last reprinted in 1945. It contains about 440 photographs and sketches pertinent to text and includes 120 tables incorporating essential data. Sources of material presented in the book are practically coextensive with the entire steel casting industry and include literature on subjects covered as well as much unpublished information made available for the first time by individuals and corporations within and outside the industry.

Following a brief history of the steel casting industry, particular emphasis in the new edition is devoted to largely expanded discussion of classes and industrial uses and detailed treatment of the subject of steel casting design. Detailed attention is given to manufacturing processes, with thorough sections dealing with pattern equipment, melting practice, molding and coremaking, finishing operations, inspection and heat treating facilities and operations.

Other specialized informative material includes chapters on variables affecting mechanical properties of steel castings; mechanical properties of carbon cast steels, with separate discussion of mechanical properties of low carbon, medium carbon and

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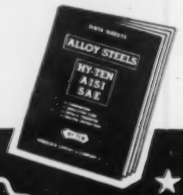

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high carbon cast steels; similar separate delineation of properties of low alloy cast steels, including properties of various low alloy cast steels as related to certain composition types and alloy steel castings for pressure containing parts suitable for high temperature service.

Also included is a five-page section listing recommendations to purchasers of steel castings and separate chapters devoted to steel casting specifications and common definitions of frequently used foundry terms. Chemical compositions of standard steels are dealt with informatively in the appendix.

Metals List Revised

Standard Metal Directory, cloth, 818 pages, 6 x 9¼ inches; published by Atlas Publishing Co. Inc., New York, for $15.00; available from STEEL, Penton Bldg., Cleveland 13, O.

The 1950 edition is a complete revision of the old one. It is divided into five sections covering iron and steel plants, ferrous and nonferrous metal foundries, metal rolling mills, metal rolling plants and smelters of nonferrous metals. It contains more than 10,000 detailed reports on steel mills, foundry, smelters, rolling mills and nonferrous metal plants, that are located in the United States and Canada.

Plants are listed both geographically and alphabetically. Reports give name of company, its capitalization, plant equipment, products manufactured, primary and secondary raw materials consumed, names of company's officers, purchasing agent and sales manager.

This twelfth edition also contains special lists of distributors of pig iron, ores, ferroalloys; coke ovens in the United States; fabricators and distributors of iron and steel products; metal stamping plants; forging manufacturers; die cast plants; metal powder producers and sellers; smelters and refiners of primary and secondary nonferrous metals; storage battery manufacturers; galvanizing plants; aircraft manufacturers; automotive vehicle manufacturers; dealers in pipe and rails; scrap iron and scrap metal dealers; importers and exporters; dealers in used structural steel; operators of hydraulic presses; railway purchasing agents.

Die Casting Data

Die Casting, by H. H. Doehler, chairman of the board, Doehler-Jarvis Corp., New York; cloth, 502 pages, 6¼ x 9¼ inches; published by McGraw-Hill Book Co., New York, for $8.00; available from STEEL, Penton Bldg., Cleveland 13, O.

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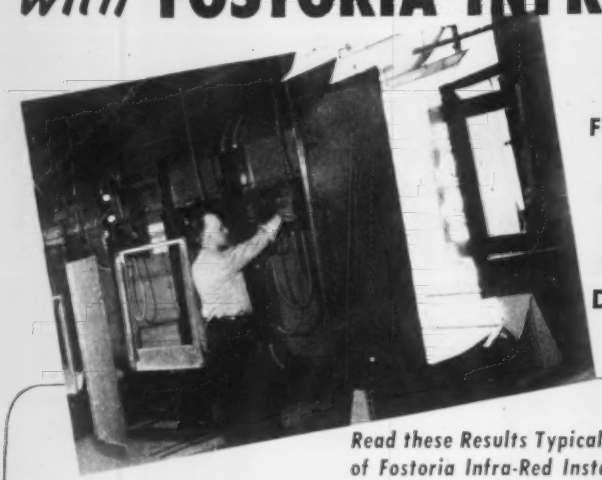

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the entire die casting process. It discusses the production, engineering design and materials of die casting and points out probable trends and developments in the near future. Each aspect of the subject receives full treatment slanted to meet the needs of metallurgists, equipment and product designers, production supervisors, engineers and others directly engaged in the design, production and use of die casting equipment.

Production data on hydrauliscope analysis of injection processes, automatic ladling, die selection and die manufacturing and other phases of die casting that have not been fully covered before are included. Common practices for machining and hobbing dies, methods of metallurgical control of die steels, and heat treatment of dies are also described. Practical data on cause and cure of erosion, heat checks, cracking and wear of die steels are provided.

Special features of the well-illustrated book include a practical discussion of the economic design of die castings, how to estimate die casting costs and what to include on drawings of parts to be cast. Multiple-cavity dies and unitized die construction, as well as simple single cavity units are all treated in detail. The author summarizes common mechanical, electroplated, chemical and organic finishes for various die casting alloys.

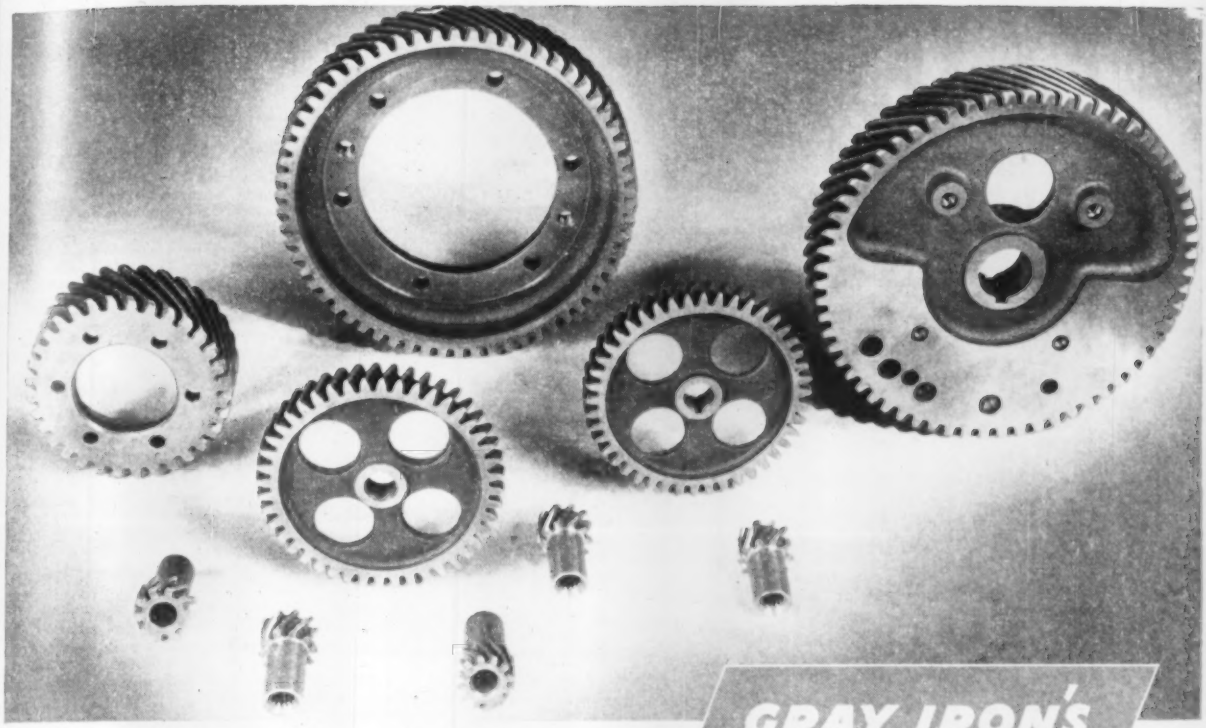
The final chapter is devoted to safety in the die casting plant. This is followed by a glossary of terms used in die casting.

Using the Right Alloy Pays

Seven case histories showing how Republic Steel Corp. alloy metallurgists helped customers increase production and cut costs through the intelligent specification of alloy steels are contained in a booklet titled "Republic Alloy Steels and How To Get the Most Out of Them." They are selected from widely varied fields to demonstrate the versatility of alloy steels. Booklet is available from Republic Steel Corp.'s advertising division located at 3100 E. 45th St., Cleveland 27.

Cuts Dictation Costs

Remote control dictation is described in a booklet by Thomas A. Edison Inc., West Orange, N. J. The so-called Televoice system is made up of one to 20 telephone dictating stations wired to a central recording instrument. This feature reduces costs by eliminating individual recording machines. Present design is simplified to reduce maintenance costs for companies using the system.



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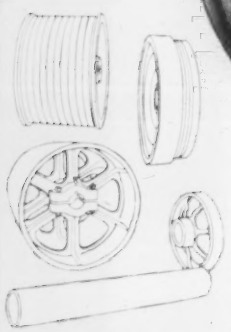

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CALENDAR OF MEETINGS

† *Denotes first listing in this column.*

Mar. 28-29, Instrument Society of America: Iron and steel instrumentation conference. Carnegie Institute of Technology, co-sponsor. Roosevelt Hotel, Pittsburgh. Society address: 921 Ridge Ave., Pittsburgh.

Apr. 2-3, Diamond Core Drill Mfrs. Association: Annual meeting. The Homestead, Hot Springs, Va. Association address: 122 E. 42nd St., New York.

Apr. 2-4, American Institute of Mining and Metallurgical Engineers: Open hearth and blast furnace, coke oven and raw materials conference. Statler Hotel, Cleveland. Institute address: 29 W. 39th St., New York.

Apr. 2-5, Boston and Apr. 9-12, Cleveland, American Chemical Society: Annual meeting. Society address: 1155 16th St., Washington 6.

Apr. 2-5, American Society of Mechanical Engineers: Spring meeting, Biltmore Hotel, Atlanta. Society address: 29 W. 39th St., New York 18.

Apr. 2-6, Radioisotopes in Industry, Conference: Case Institute of Technology, Cleveland. Conference address: Case Institute of Technology, Cleveland 6.

Apr. 4-6, Midwest Power Conference: Sherman Hotel, Chicago. Conference address: Illinois Institute of Technology, Technology Center, Chicago 6.

Apr. 5, National Metal Trades Association: Annual meeting, New England Congress. Sheraton-Biltmore Hotel, Providence, R. I.

Apr. 8-12, American Hardware Manufacturers Association: Spring convention. Biltmore Hotel, Palm Beach, Fla. Association address: 342 Madison Ave., New York 17.

†**Apr. 8-12, The Electrochemical Society Inc.:** Annual convention, Park Hotel, Washington. Society address: 235 W. 102nd St., New York 25.

†**Apr. 9-10, American Institute of Steel Construction:** Spring engineering conference. William Penn Hotel, Pittsburgh. Institute address: 101 Park Ave., New York 17.

Apr. 10-11, Westinghouse Machine Tool Electrification Forum: Westinghouse Electric Corp., sponsor, William Penn Hotel, Pittsburgh. Forum address: 306 Fourth Ave., Pittsburgh 30.

Apr. 10-11, Society of Automotive Engineers: Annual earthmoving industry conference. Peoria, Ill. Society address: 29 W. 39th St., New York.

†**Apr. 15-18, Scientific Apparatus Makers Association:** Annual meeting, all sections, The Greenbrier, White Sulphur Springs, W. Va. Society address: 20 N. Wacker Drive, Chicago 6.

Apr. 16-18, American Society of Lubrication Engineers: Annual convention and show, Bellevue Stratford Hotel, Philadelphia. Society address: 343 S. Dearborn St., Chicago 4.

Apr. 18-21, National Screw Machine Products Association: Annual meeting, Netherland Plaza Hotel, Cincinnati. Association address: 13210 Shaker Square, Cleveland 20.

†**Apr. 19-20, American Machine Tool Distributors Association:** Annual meeting, Edgewater Beach Hotel, Chicago. Association address: 1900 Arch St., Philadelphia 3.

Apr. 22-26, American Ceramic Society: Annual meeting, Palmer House, Chicago. Society address: 2525 N. High St., Columbus, O.

Apr. 23-26, American Foundrymen's Society: Annual national technical convention, Buffalo. Association address: 616 S. Michigan Ave., Chicago 5.

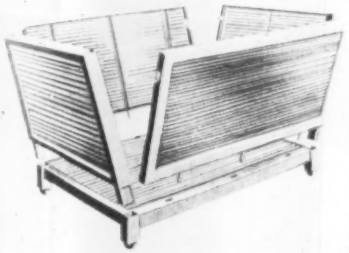
†**Apr. 25-26, Metal Powder Association:** Annual metal powder show, Cleveland Hotel, Cleveland. Association address: 420 Lexington Ave., N. Y. 17.

Apr. 30-May 4, Materials Handling Institute: Fourth National Materials Handling Exposition, International Amphitheatre, Chicago. Institute address: 1108 Clark Bldg., Pittsburgh.

New Products and Equipment

Material Handling Costs Cut

Stacking features of the Hazen Knock-Down box made by Jervis B. Webb Co., 8933 Alpine Ave., Detroit 4, Mich., permits transportation and stacking of loaded or empty boxes in multiple numbers. Four normal carloads of filled boxes can be returned empty in one car. Boxes can be used as bins with bases over their



tops to conserve floor space. These containers are interlocking and reduce the need for loading binders and strapping during shipment. Removable sides allow easy access to contents and may be placed in position after box is loaded. Use as storage cabinets or shelves is possible.

Containers are constructed of square tubular steel frames, corrugated steel panels and sides are secured by dowel pins fitting into the base frame to prevent springing. Boxes also can be supplied with wire mesh and canvas sides. Standard dimensions of the A model is 48 inches long with 27.5 cu ft capacity and the B model, 54 inches long 30 cu ft volume.

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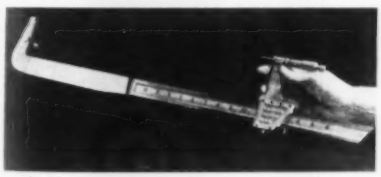
Versatile Micrometer

A V-notch adjustable micrometer made by Lester Micrometer Co., 3210 Cedar Ave., Cleveland 15, O., can be used in place of several ordinary



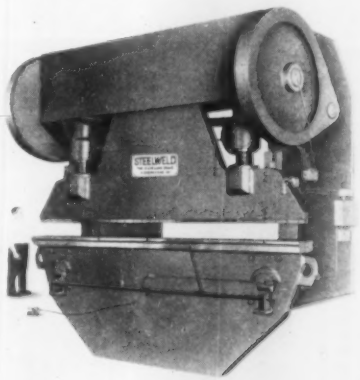
micrometers. A series of 12 or 24 V-shaped notches are spaced exactly 1 inch apart on a tool steel blade. A carrier, sliding on the blade and holding a standard 1-inch micrometer head, is positioned on the desired notch and a spring clamp inserted, locking carrier to the blade. Setting is automatic, repetitive and eliminates groping.

The 1-inch distance between notches is divided into 0.001-inch by the micrometer head. Spring clamp also acts as a safety mechanism should severe pressure be applied to the micrometer head. Units are available immediately in 12 and 24-inch length ranges starting with a 0-12-inch micrometer. Various throat sizes can be supplied to handle whatever diameters must be measured.

Check No. 2 on Reply Card for more Details

Large Steelweld Press

Model RS6½-14 Steelweld press is the largest built to date by Cleveland Crane & Engineering Co., Wickliffe, O. Press will bend mild plate up to 20 feet by ½-inch. It can handle 14-



foot sheets between the end housings. The stroke is 6½ inches and throat depth is 18 inches.

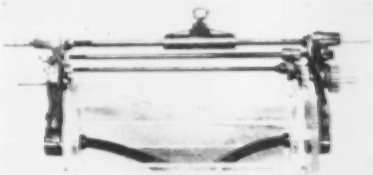
Overall dimensions are: Length 20-ft, depth 11-ft, height 18-ft 6-in. Machine is operated by an electric air valve controlled by a foot switch, a foot treadle or hand operated lever placed on the front which extends nearly the entire length of press. Speeds of either 7 or 21 strokes per minute are obtainable by a gear shifter.

Check No. 3 on Reply Card for more Details

Plexiglas Plating Cylinder

Plexiglas cylinders for barrel plating are available from Hanson-Van Winkle-Munning Co., Matawan, N. J. Suitable for either cyanide or acid solution, cylinders may be used in the cleaning, pickling and plating cycles. Where cyanide solutions are present, cylinders are equipped with 90-tooth cast iron gears with cast iron hangers. For acid solutions the gears are plexiglas and the cast iron hanger arms are rubber-covered. The cylinder is guaranteed to be satisfactory up to 185° F.

Cylinder panels are V-shaped in cross-section with the point of the V inward to provide tumbling action and prevent work from sliding. Pan-



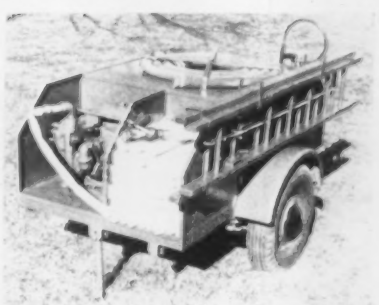
els are ½-inch thick; heads, 1 inch thick. Flexible dangler contacts prevent bridging and lower maintenance cost.

Check No. 4 on Reply Card for more Details

Fire Fighting Trailer

Preakness Engineering Co., Newark, N. J., announces a fire fighting trailer to fill the gap between hand extinguishers and self-propelled trucks. Model PRS2250 carries 200 gallons of water and is connected directly through the pump to 300 feet of fire hose. Water can be discharged as a stream or a fog. Mechanical foam nozzle will produce 350 gpm of foam for flammable liquid fires. Pump is portable and may be used on any water supply.

Accessory equipment includes nozzles, extension ladder, fire axe, hand

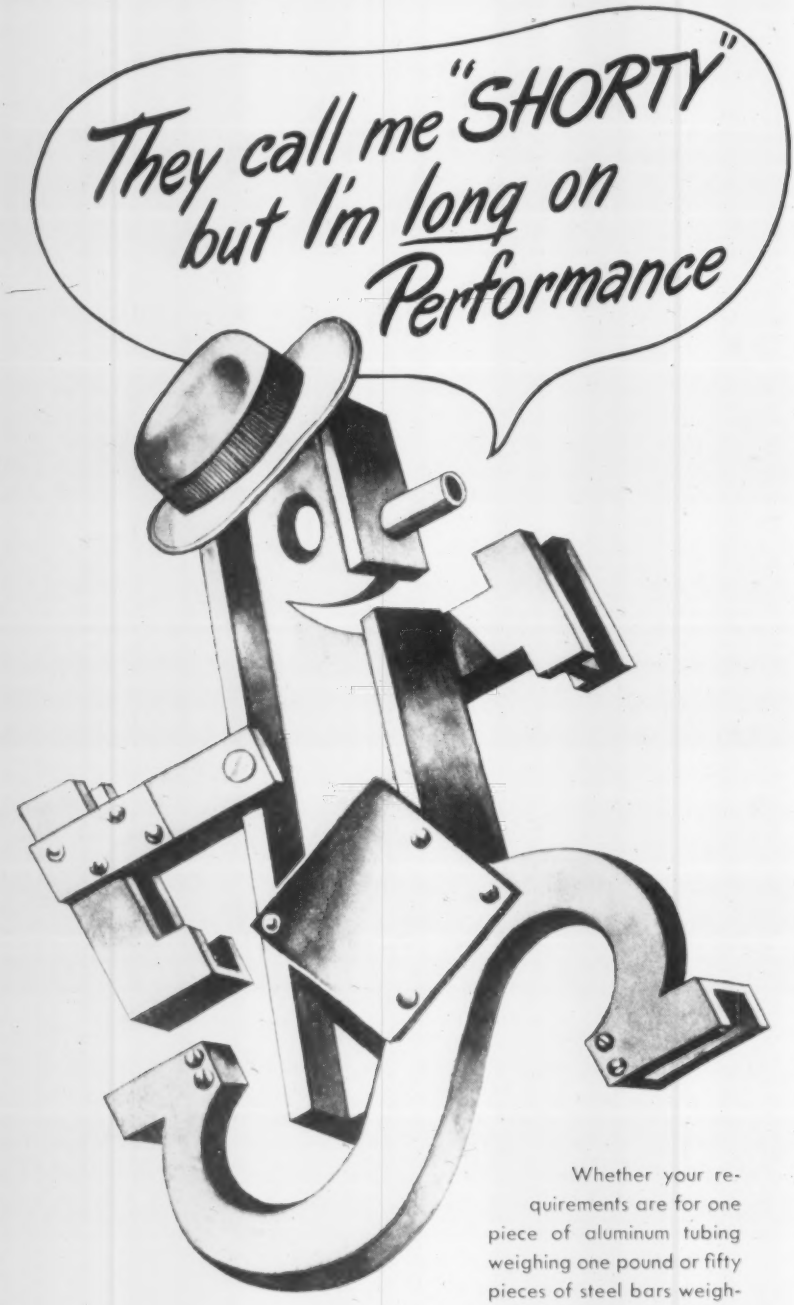


extinguisher and suction strainer. Trailer is suspended on leaf springs and fitted with pneumatic tires. Front and rear stanchions permit leveling on uneven ground.

Check No. 5 on Reply Card for more Details

Drills Small Holes

A precision drilling machine developed by Louis Levin & Son Inc., 782 E. Pico Blvd., Los Angeles 21, Calif., will drill small holes from about a



Whether your requirements are for one piece of aluminum tubing weighing one pound or fifty pieces of steel bars weighing ten thousand pounds—your requirements will always get my full attention. Every inquiry receives the benefit of my long experience in turning your needs into a fulfilled order.

"Shorty"

LSS-12

Levinson

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20TH AND WHARTON STS. S. S., PITTSBURGH, PA.

No. 80 drill on down. In order to have drills run true the press is designed so the spindle holds collets of the same type as those used in the company's jewelers' lathes. Drills as small as 0.022-inch in diameter can be held in a proper size collet with the assurance that they will run true.

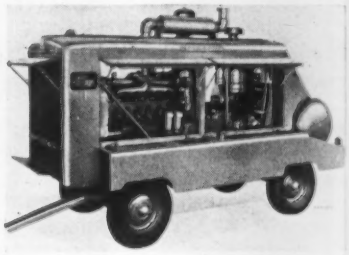
Collets used are stocked in sizes from 0.1 mm to 1.0 mm in increments of 0.05 mm and from 1.1 mm to 5.0 mm in increments of 0.1 mm. For special work collets are available in sizes up to 6.4 mm (¼-inch) in increments of 0.1 mm but with a hole depth of only ¾-inch. A 1/20 hp motor supplies the power and standard pulley spindle speeds of 1000, 1750 and 3000 rpm are available.

Check No. 6 on Reply Card for more Details

Large Compressor Volume

A rotary type compressor designated as the Gyro-Flow 600 is announced by Ingersoll-Rand Co., Phillipsburg, N. J. It delivers 600 actual cfm free air at 100 psi. Total weight is 9500 pounds ready for use.

Compressor itself is an advanced-design, two-stage, oil-cooled rotating vane compressor. It eliminates pistons, connecting rods, valves and the



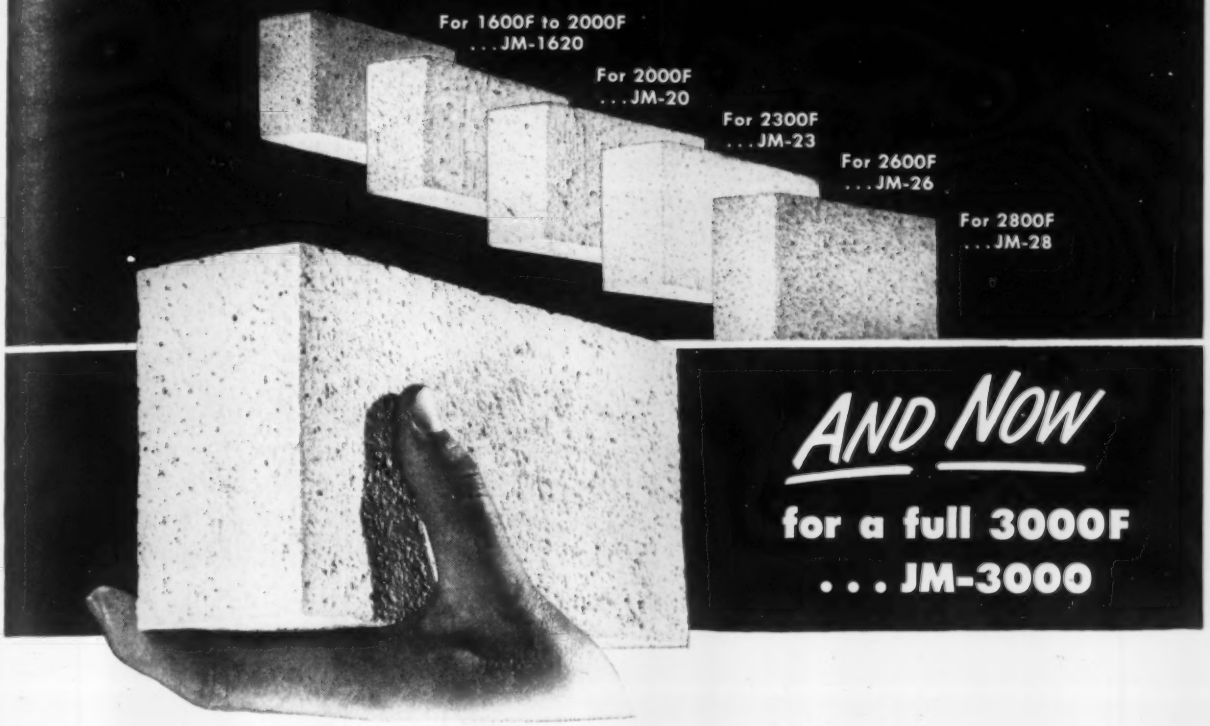
need for a clutch. Air is discharged at less than 200° F under normal operating conditions. This, together with thorough oil separation, eliminates hose deterioration which is caused by heat and oil. Unit is driven by the General Motors series 71 diesel engine. Compressor controls smoothly and automatically over the full range from 0 to 100 per cent capacity and allows only a 10 pound fluctuation of pressure.

Check No. 7 on Reply Card for more Details

Portable Work Tower

A telescoping tower that is easily rolled anywhere and locked in working position is a development of Safway Steel Products Inc., 6234 W. State St., Milwaukee 13, Wis. It has a capacity of 400 pounds and weighs 600 pounds. Work platform is elevated through extension of a hydraulic ram with a hydraulic pump operated by a battery powered electric motor.

MEET the family of Johns-Manville Insulating Fire Brick . .



AND NOW for a full 3000F . . . JM-3000

HERE IS AN OUTSTANDING FAMILY of insulating fire brick for back-up or exposed use . . . the only family of its kind . . . that gives you a complete range . . . a *quick heating* insulating fire brick for every purpose.

By taking advantage of the quick heating characteristics of these insulating fire brick, you'll benefit through important savings in fuel because of the quicker rise to proper operating temperature in the furnace. This is a result of the low heat storage capacity and low thermal conductivity characteristics of the brick. These factors are especially important where furnaces are being intermittently operated.

The same materials can also be obtained in large size units as Johns-Manville Insulating Fireblok. This product has many advantages over the smaller size fire brick, from both a construction and stability standpoint. They can be quickly applied because they are easy to cut and fit. J-M Insulating Fireblok provide additional heat savings because they reduce the number of joints, and require less mortar for bonding.

Why not have a Johns-Manville insulation expert call to tell you more about ways in which you can save by using these insulations in your furnaces. Write Johns-Manville, Box 290, New York 16, N. Y. for further information.

	JM-1620	JM-20	JM-23	JM-26	JM-28	JM-3000
Densities, lb per cu ft	29	35	42	48	58	63-67
Transverse Strengths, psi	60	80	120	125	120	200
Cold Crushing Strengths, psi	70	115	170	190	150	400
Linear Shrinkage,† percent	0.0 at 2000 F	0.0 at 2000 F	0.3 at 2300 F	1.0 at 2600 F	4.0 at 2800 F	0.8 at 3000 F
Reversible Thermal Expansion, percent	0.5—0.6 at 2000 F	0.3—0.6 at 2000 F	0.5—0.6 at 2000 F	0.5—0.6 at 2000 F	0.5—0.6 at 2000 F	0.5—0.6 at 2000 F
Conductivity* at Mean Temperatures						
500 F	0.77	0.97	1.51	1.92	2.00	3.10
1000 F	1.02	1.22	1.91	2.22	2.50	3.20
1500 F	1.27	1.47	2.31	2.52	3.00	3.35
2000 F	—	1.72	2.70	2.82	3.50	3.60
Recommended Service						
Back up	2000 F	2000 F	2300 F	2600 F	2800 F	3000 F
Exposed	1600 F	2000 F	2300 F	2600 F	2800 F	3000 F

† *24-hr simulative service panel test for JM-3000; 24-hr soaking period for other brick.*

* *Conductivity is expressed in Btu in. per sq ft per F per hour at the designated mean temperatures.*

Note: Above tests are in accordance with A.S.T.M. tentative standards.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville First in INSULATIONS

"Pleased as PUNCH"

No production-line bottlenecks . . . and no hold-up in filling DO's since the grinding supervisor started using Simonds Abrasive Company wheels. No wonder he's pleased. You'll find plenty of satisfaction . . . and serviceability too . . . in these efficient production tools. Send now for free data book describing Simonds grinding wheels, mounted wheels and points, segments and abrasive grains . . . products proven in everyday industrial use . . . and backed by Simonds 50 years experience as a major grinding wheel manufacturer.

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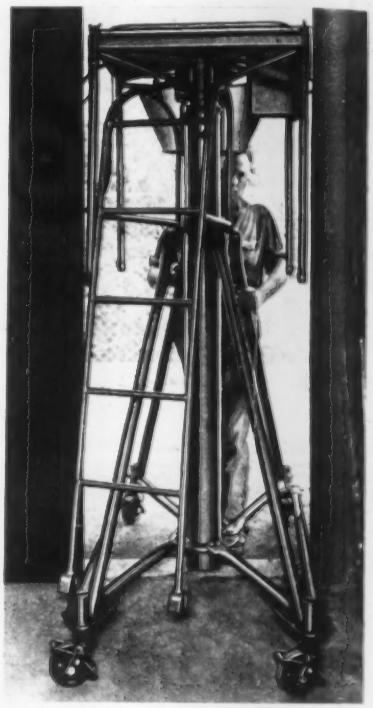
grinding wheels

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON
DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

A 6-volt battery rated at 110 amp hours capacity will raise the tower 45 consecutive times on one charge and can be recharged overnight to permit use the following day.

Pressing the foot lever in one direction makes an electric contact to elevate the platform, turning it in the opposite direction will release the hydraulic pressure to lower platform. Loaded platform may be raised from its retracted height of 7 feet to the maximum of 17 feet above the floor



in 25 seconds. Lowering of platform is at a controlled speed which protects the worker. Hydraulic pressure can only be released gradually so that the platform descends by gravity at the rate of 1 foot per second or 10 seconds for the full 10-foot travel. Platform cannot drop suddenly even in the event of complete hydraulic failure. If full pressure is released instantaneously, the telescoping safety tube insures a safe, gradual descent of the work platform.

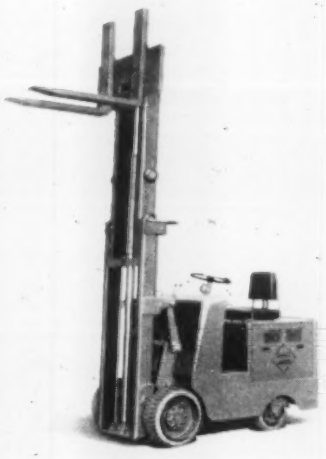
Check No. 8 on Reply Card for more Details

Electric Fork Truck

An electric fork truck featuring a single-cylinder, low-pressure, double-action hydraulic hoist system is announced by Elwell-Parker Electric Co., Cleveland, O. A cushioning effect between truck and load and an automatic protection against overload are operating advantages. Hoisting mechanisms have been simplified resulting in easier repairs and lower mainten-

ance costs. Sealed-in, self-lubricating motors, hoisting apparatus and hydraulic system reduce friction and increase the cleanliness of the machine and floors.

Lower and upper frames are hot-pressed alloy steel channels and the upper frame is equipped with sealed



roller bearings. Hydraulic cylinder is centered in the hoist frames for improved visibility. Height of truck with hoist fully extended is 145 inches and maximum lift of fork is 126 inches. Length overall with a 36-inch fork is 118 inches. Travel speed fully loaded is 5 mph.

Check No. 9 on Reply Card for more Details

Pressure Cells

Differential pressure cells based on SR-4 resistance wire strain gage measurement are being produced by Baldwin-Lima-Hamilton Corp., Philadelphia. These cells are interchangeable with full compensation for tem-

perature and linear acceleration. Pressure ranges available are plus or minus 10 and 20 psi with maximum line pressures of 50 to 100 psi respectively.

This cell, Type FMB, consists of

strip fed from coils

FOLLANSBEE COLD ROLLED STRIP is furnished in continuous coils for direct feeding into automatics. This time-saving method of supplying material to stamping and forming machines is a big step toward increased production.

turns an automatic machine

FOLLANSBEE COLD ROLLED STRIP is widely used in plants manufacturing toasters, tractors and television equipment where high-speed automatic machines turn out parts in astronomical numbers. Continuous feeding from coils is essential to maintaining volume.

into a productioneering team

FOLLANSBEE COLD ROLLED STRIP is furnished to specification—custom-made strip steel in coils suitable for a multitude of productioneering operations. Call the Follansbee Steel Representative nearest you for details on temper, finish, coil sizes, et cetera.

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two matched monel pressure bellows arranged to apply opposing forces on a cantilever beam to which strain gages are bonded. The sensing element is hermetically sealed in an aluminum box. Electrical connections are made through glass-to-metal seals. Cell is insensitive to linear acceleration in any direction and may be mounted in any position without affecting pressure indications. Cells are designed for standard 120 and 300-ohm circuits. Temperature compensations for zero and span are featured.

Check No. 10 on Reply Card for more Details

• • •

DETERMINES CARBON: Carbon in mild steel baths may be determined quickly by the melters carbon test available from Harry W. Dietert Co., Detroit 4, Mich. Under controlled conditions of the test, a hardness tester graduated in per cent carbon gives carbon results to within 0.02 per cent in the 0.05 to 0.45 per cent carbon range. Equipment is designed to give long service on the melting floor.

Check No. 11 on Reply Card for more Details

BUSHINGS, END PLUGS: Carlon Products Corp., Cleveland 5, O., announce a new line of injection-molded plastic reducing bushings and end plugs for use with Carlon plastic pipe. Units feature a hexagonal ring for positive wrench grip to facilitate installation and utilize International pipe threads. Bushings are available in sizes ranging from 2 x 1½ inches down to ¾ x ½-inch and pipe plugs from 2 inches to ½-inch.

Check No. 12 on Reply Card for more Details

POSITIONS HOT STUFF: Easy positioning of hot or heavy laboratory equipment at various levels above the workbench is possible by the use of Lab-Lift, made by Fisher Scientific Co., Pittsburgh 19, Pa. It has a platform which can be adjusted to any point from 11-12 to 18½ inches above the workbench by turning a screw-support to which platform is attached.

Check No. 13 on Reply Card for more Details

PRECISION SPINDLES: For production and tool room operations where extreme accuracy must be maintained, Vulcan Tool Co., Dayton 10, O., introduces Vulcanaire precision spindles. Only 3 5/16-inches long, they are adaptable to practically any machine for high precision production; finishing contours on hardened steel working surfaces for cams, fingers, or levers; burring or milling die castings; routing wood contours; carbide milling and finishing slots.

Check No. 14 on Reply Card for more Details

OIL FILTER CARTRIDGE: Micro-Fine oil filter cartridge, introduced by Wisconsin Motor Corp., Milwaukee, Wis., is designed for the lubrication system of the company's V-type, four-cylinder air-cooled engines. It removes solids of micron size and holds its own dry weight of acids, dirt and fillings.

Check No. 15 on Reply Card for more Details

NO SPRINGS: Ross Operating Valve Co., Detroit 3, Mich., offers an air control solenoid valve in which springs have been eliminated. Valve is designed to move to a safe position even if air or electrical supply should be interrupted. It operates with line pressures of 40 to 125 psi, but can be designed to work outside these limits. Valve is available in ¼ to 1¼-inch pipe sizes, straightway or three-way, normaly closed or open.

Check No. 16 on Reply Card for more Details

DRILL JIGS: Parlec drill jigs, made by Universal Tool Co., Los Angeles, Calif., enables toolmaker or driller to machine the base of the jig for properly locating the part to be drilled, cut holes in the cover and insert the bushings to complete jig required. Parlex box drill jig is available in five standard sizes: 1½ x 2, 3 x 3½, 3½ x 5¾, 6 x 6 and 1½ x 6 inches. Jigs with special sizes for covers and heights are furnished on order.

Check No. 17 on Reply Card for more Details

FOR EMERGENCY SHUTOFF: Heavy duty cast iron valve No. 763 is rubber seated and was developed by R-S Products Corp., Philadelphia 44, Pa., for emergency gas or liquid shutoff service. With angular seating vane for wedge type closure, rubber is compressed around periphery of vane to give positive shutoff even around shaft bosses. It is made in sizes from 2 to 72 inches.

Check No. 18 on Reply Card for more Details

BRAZING COMPOUND: No. 45 brazing compound, bronze ground to specified mesh and mixed with flux, is offered by All-State Welding Alloys Co. Inc., White Plains, N. Y. It is a light gray powder to be mixed with water before application. It will flow at about 180° F and produce a thin yellow alloy with fillets of similar size to those of silver solder. Alloy will run through the joint and develop a shear strength of 80,000 psi.

Check No. 19 on Reply Card for more Details

LIGHTWEIGHT TROLLEYS: Wright Hoist Division, American Chain & Cable Co. Inc., York, Pa., offers a new line of Wright-Way trolleys in ½ to 3-ton capacity. They are made for use in industrial applications that do not require high efficiency or high factor of safety of Wright Timken, Hyatt or S.A.R.B. trolleys. They feature chilled tread wheels, husky roller bearings, heavy steel axles, equalizing pin and becket strap and heavy fabricated steel side plates.

Check No. 20 on Reply Card for more Details

RESIN CEMENT: Atlas Mineral Products Co., Mertztown, Pa., has developed a resin cement, Conductoplast which may be cast in almost any form and exhibits practically no voltage drop when used as a conductor. It can be plated and has a tensile strength of 1500 psi, a compression strength of 15,000 psi. The company also developed Resistoplast which has same properties as Conductoplast except that it does not conduct current.

Check No. 21 on Reply Card for more Details

PALLET BOX: Ironbound Box & Lumber Co., Hillside, N. J., announces a new type pallet box with two-way or four-way entry type pallet bottom. Hardwood box is reinforced with outside and inside steel corner angles bolted throughout. Spacing of bottom boards can be varied to accommodate standard fork or hand pallet trucks. Extended and flared corner angles at top of box permit positive locking of tiered boxes.

Check No. 22 on Reply Card for more Details

PNEUMATIC SCREW DRIVER: Known as 9SPF-10B, a nonreversible screwdriver, offered by Cleco Division, Reed Roller Bit Co., Houston 1, Texas, has three-finger adjustable clutch with slip-impact action for final tightening of the driven screw. The air-operated tool can be converted from a screwdriver into a nutrunner in less than half a minute without use of special tools. It has a capacity of ¼-inch bolts and screws.

Check No. 23 on Reply Card for more Details

FOR MORE INFORMATION
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

The Market Outlook

DEFENSE and related emergency programs are taking an increasingly larger bite of steel production. While indications point to no change in the number of directives for June, a modest overall increase in requirements for established programs is expected that month, possibly up to 50,000 tons. Defense needs, however, are continuing to rise. Prospects are by July 1 approximately 40 per cent of steel production will be destined for emergency account under some type of preference, leaving no more than 60 per cent for non-rated civilian needs. Translated into tonnage on the basis of average monthly production so far this year, this means the defense take by midyear will be running somewhere in excess of 3 million tons monthly, just under 5 million tons being left for non-rated consumer durable goods.

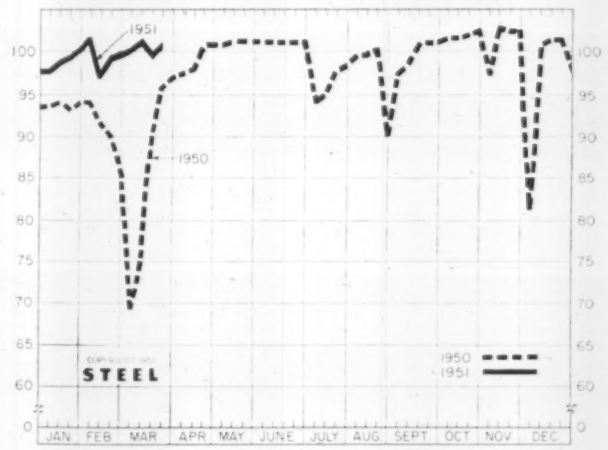
DISTRIBUTION—With the steel supply problem becoming steadily more complex the control authorities are making all haste to put a Controlled Materials Plan into effect by July 1 if possible. But opinion is noticeably divided as to whether the new CMP should be open-ended or closed. Mounting defense steel needs are giving rise to misgivings in some quarters as to the advisability of establishing an open-ended CMP. Some trade leaders appear convinced a closed plan should be put into effect, or none at all. In any event, a decision, one way or the other, should be forthcoming shortly since June allocations for directive programs now are under consideration and June, presumably, was to be the last month under the loose priorities and allocations system.

SCHEDULING—Some of the confusion as to mill scheduling procedure, apparent in steel circles a week ago, has disappeared. This uncertainty stemmed from the placing of virtually all government directives on a DO-rated basis. Steel producers generally appear to be adhering to their original plan of allocations for May directive programs, notwithstanding the rated numbers imposed subsequently. They are acting, in effect, as if the new DO numbers are simply for identification purposes and are not a part of the DO-rated priority system which proceeds on a "first-come-first-served" basis. Increases in the minimum tonnage percentages which the mills must set aside for DO-rated work has caused little easing in delivery promises on defense account, swelling DO-rated specifications being an offsetting influence in this regard. Once again most mills have little tonnage left for delivery in second quarter.

WAREHOUSE SUPPLY—Most important recent development in steel distribution control involves amendment of NPA regulation M-6 affecting steel supply for the warehouses. The amended order is of particular significance to small manufacturing business which is dependent on the warehouses as steel supply sources. Under amended M-6 the distributors are to receive 85 per cent of their average monthly tonnage of carbon steel products supplied them by the mills in the first nine months of 1950. This is to include DO-rated tonnage. Under the original warehouse order the distributors were to have received up to 100 per cent of their monthly average steel take in the base period after rated and directive needs were cared for. They also could add DO-rated tonnage to their quotas. Whether the amended order will improve the warehouses' inventory position remains to be seen. There is a difference of opinion on this score in the trade, some interests anticipating even smaller receipts from the mills than they had been receiving. Much depends, it is said, on whether the mills regard the 85 per cent tonnage figure as a floor and not a ceiling on shipments.

PRODUCTION—Steelmaking operations went up 1 point last week, the national ingot rate rising to 100.5 per cent of capacity, weekly output again exceeding the 2 million-ton mark.

NATIONAL STEELWORKS OPERATIONS



DISTRICT INGOT RATES

Percentage of Capacity Engaged at Leading Production Points

	Week Ended Mar. 24	Change	Same Week 1950	Same Week 1949
Pittsburgh	89.5	−1.5*	97.5	100
Chicago	106	−0.5*	98.5	101
Mid-Atlantic	100.5	0	87	95.5
Youngstown	106	0	100	101
Wheeling	97	+0.5	101	96.5
Cleveland	103	+2.5*	99.5	106
Buffalo	104	0	104	104
Birmingham	100	0	100	100
New England	90	0	82	86
Cincinnati	104	0	103	103
St. Louis	97	0	88.9	82.5
Detroit	107	0	106	111
Western	102	+2	87	97
Estimated national rate	100.5	+1	96	101

† Based on weekly steelmaking capacity of 1,999,034 tons for 1951; 1,928,721 tons for second half, 1950; 1,906,268 tons for first half, 1950; 1,843,516 tons for 1949.
*Change from revised rate for preceding week.

The Metalworking Outlook — p. 37 Production-Engineering News — p. 73

Composite Market Averages

	Mar. 22 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
FINISHED STEEL INDEX, Weighted:					
Index (1935-39 av.=100)...	171.92	171.92	171.92	156.13	111.62
Index in cents per lb.	4.657	4.657	4.657	4.230	3.024
ARITHMETICAL PRICE COMPOSITES:					
Finished Steel, NT	$106.32	$106.32	$106.32	$93.18	$63.54
No. 2 Fdry. Pig Iron, GT..	52.54	52.54	52.54	46.47	25.42
Basic Pig Iron, GT.....	52.16	52.16	52.16	45.97	24.75
Malleable Pig Iron, GT....	53.27	53.27	53.27	47.27	26.04
Steelmaking Scrap, GT ...	44.00	44.00	44.00	27.50	19.17

Weighted finished steel index based on average shipments and Pittsburgh district prices of the following 14 representative products during 5-year base period 1935-39. Structural shapes, plates, rails, hot-rolled and cold-finished bars, pipe, wire, nails, tin plate, hot and cold-rolled sheets, galvanized sheets, hot and cold-rolled strip. For complete explanation see STEEL, Sept. 19, 1949, p. 54.

Arithmetical steel price composite based on same products as the weighted finished steel index with the exception of rails, cold-finished bars, galvanized sheets and hot-rolled strip.

Basic and No. 2 foundry pig iron composites are based on average prices at Pittsburgh, Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Granite City, Youngstown. Malleable composite based on same points, except Birmingham.

Steelmaking scrap composite based on average prices of No. 1 heavy melting steel at Pittsburgh, Chicago and Philadelphia.

Comparison of Prices

Comparative prices by districts, in cents per pound except as otherwise noted. Delivered prices based on nearest production point.

FINISHED MATERIALS

	Mar. 22 1951	Week Ago	Month Ago	Year Ago	5 Yrs. Ago
Bars, H.R., Pittsburgh....	3.70	3.70	3.70	3.45	2.50
Bars, H.R., Chicago.....	3.70	3.70	3.70	3.45	2.50
Bar, H.R., del. Philadelphia	4.18	4.18	4.18	3.93	2.82
Bars, C.F., Pittsburgh	4.55	4.55	4.55	4.10–15	3.10
Shapes, Std., Pittsburgh ..	3.65	3.65	3.65	3.40	2.35
Shapes, Std., Chicago	3.65	3.65	3.65	3.40	2.35
Shapes, del. Philadelphia..	3.90	3.90	3.90	3.46	2.465
Plates, Pittsburgh	3.70	3.70	3.70	3.50	2.50
Plates, Chicago	3.70	3.70	3.70	3.50	2.50
Plates, Coatesville, Pa. ...	4.15	4.15	4.15	3.60	2.50
Plates, Sparrows Point, Md.	3.70	3.70	3.70	3.50	2.50
Plates, Claymont, Del.	4.15	4.15	4.15	3.60	2.50
Sheets, H.R., Pittsburgh...	3.60–75	3.60–75	3.60–75	3.35	2.425
Sheets, H.R., Chicago	3.60	3.60	3.60	3.35	2.425
Sheets, C.R., Pittsburgh ..	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Chicago	4.35	4.35	4.35	4.10	3.275
Sheets, C.R., Detroit	4.55	4.55	4.55	4.30	3.375
Sheets, Galv., Pittsburgh..	4.80	4.80	4.80	4.40	4.05
Strip, H.R., Pittsburgh...	3.75–4.00	3.75–4.00	3.75–4.00	3.25	2.35
Strip, H.R., Chicago	3.50	3.50	3.50	3.25	2.35
Strip, C.R., Pittsburgh ..4.65–5.35		4.65–5.35	4.65–5.35	4.15	3.05
Strip, C.R., Chicago	4.90	4.90	4.90	4.30	3.15
Strip, C.R., Detroit 4.35–5.60		4.35–5.60	4.35–5.60	4.35–40	3.15
Wire, Basic, Pittsburgh..4.85–5.10		4.85–5.10	4.85–5.10	4.50	3.05
Nails, Wire, Pittsburgh ..5.90–6.20		5.90–6.20	5.90–6.20	5.30	3.25
Tin plate, box, Pittsburgh.	$8.70	$8.70	$8.70	$7.50	$5.25

SEMIFINISHED

Billets, forging, Pitts.(NT)	$66.00	$66.00	$66.00	$63.00	$47.00
Wire rods, ½-⅝", Pitts. ..	4.10–30	4.10–30	4.10–30	3.85	2.30

PIG IRON, Gross Ton

Bessemer, Pitts.	$53.00	$53.00	$53.00	$47.00	$26.25
Basic, Valley	52.00	52.00	52.00	46.00	25.25
Basic, del. Phila.	56.39	56.39	56.39	49.44	27.09
No. 2 Fdry, Pitts	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Chicago	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Valley	52.50	52.50	52.50	46.50	25.75
No. 2 Fdry, Del. Phila.	56.89	56.89	56.89	49.94	27.59
No. 2 Fdry, Birm.	48.88	48.88	48.88	42.38	22.13
No. 2 Fdry (Birm.) del. Cin.	55.58	55.58	55.58	49.08	25.81
Malleable Valley	52.50	52.50	52.50	46.50	25.75
Malleable, Chicago	52.50	52.50	52.50	46.50	25.75
Charcoal, Lyles, Tenn.	66.00	66.00	66.00	60.00	33.00
Ferromanganese, Etna, Pa.	188.00	188.00	188.00	175.00	140.00*

* Delivered, Pittsburgh.

SCRAP, Gross Ton (including broker's commission)

No. 1 Heavy Melt, Pitts..	$45.00	$45.00	$45.00	$31.00	$26.00
No. 1 Heavy Melt, E. Pa.	43.50	43.50	43.50	23.50	18.75
No. 1 Heavy Melt, Chicago	43.50	43.50	43.50	27.50	18.75
No. 1 Heavy Melt, Valley..	45.00	45.00	45.00	31.75	20.00
No. 1 Heavy Melt, Cleve..	44.00	44.00	44.00	28-25	19.50
No. 1 Heavy Melt, Buffalo.	44.00	44.00	44.00	28.25	19.25
Rails, Rerolling, Chicago..	52.50	52.50	52.50	40.50	22.25
No. 1 Cast, Chicago	49.00*	49.00*	49.00*	41.00	20.00

* F.o.b. shipping point.

COKE, Net Ton

Beehive, Furn., Connlsvl..	$14.75	$14.75	$14.75	$13.25	$7.50
Beehive, Fdry., Connlsvl...	17.50	17.50	17.50	15.50	8.25
Oven Fdry., Chicago	21.00	21.00	21.00	21.00	13.00

NONFERROUS METALS

Copper, del. Conn.	24.50	24.50	24.50	18.50	12.00
Zinc, E. St. Louis	17.50	17.50	17.50	9.75	8.25
Lead, St. Louis	16.80	16.80	16.80	11.80	6.35
Tin, New York 134.00		182.00	182.50	74.125	52.00
Aluminum, del.	19.00	19.00	19.00	17.00	15.00
Antimony, Laredo, Tex. ..	42.00	42.00	42.00	24.50	14.50
Nickel, refinery, duty paid.	50.50	50.50	50.50	40.00	35.00

Pig Iron

F.o.b. furnace prices quoted under GCPR as reported to STEEL. Minimum delivered prices do not include 3% federal tax. Key to producing companies published on following two pages

PIG IRON, Gross Ton

	Basic	No. 2 Foundry	Malleable	Bessemer
Bethlehem,Pa. B2	$54.00	$54.50	$55.00	$55.50
Brooklyn,N.Y.,del.	....	58.79	59.29	....
Newark,del.	56.63	57.13	57.63	58.13
Philadelphia,del.	56.39	56.89	57.39	57.89
Birmingham District				
AlabamaCity,Ala. R2	48.38	48.88	....	....
Birmingham R2	48.38	48.88	....	....
Birmingham S9	48.38	48.88	....	....
Woodward,Ala. W15	48.38	48.88	....	....
Cincinnati,del.	....	55.58	....	....
Buffalo District				
Buffalo R2	52.00	52.50	53.00	....
Buffalo H1	52.00	52.50	53.00	....
Tonawanda,N.Y. W12	52.00	52.50	53.00	....
No.Tonawanda,N.Y. T9	....	52.50	53.00	....
Boston,del.	61.26	61.76	62.20	....
Rochester,N.Y.,del.	54.63	55.13	55.63	....
Syracuse,N.Y.,del.	55.58	56.08	56.58	....
Chicago District				
Chicago I-3	52.00	52.50	52.50	53.00
Gary,Ind. U5	52.00	....	52.50	....
IndianaHarbor,Ind. I-2	52.00	....	52.50	....
So.Chicago,Ill. W14	52.00	52.50	52.50	....
So.Chicago,Ill. Y1	52.00	52.50	52.50	....
So.Chicago,Ill. U5	52.00	....	52.50	53.00
Milwaukee,del.	53.89	54.39	54.39	54.89
Muskegon,Mich.,del.	....	57.98	57.98	....
Cleveland District				
Cleveland A7	52.00	52.50	52.50	53.00
Cleveland R2	52.00	52.50	52.50	....
Akron, del. from Cleve.	54.39	54.89	54.89	54.39
Lorain,O. N3	52.00	....	....	53.00
Duluth I-3	....	....	52.50	....
Erie,Pa. I-3	52.00	52.50	52.50	53.00
Everett,Mass. E1	....	53.25	53.75	....
Fontana,Calif. K1	58.00	58.50	....	....
Geneva,Utah G1	52.00	52.50	....	....
Seattle,Tacoma,Wash.,del.	....	60.20	....	....
Portland,Oreg.,del.	....	60.20	....	....
LosAngeles,SanFrancisco,del.	59.70	60.20	....	....
GraniteCity,Ill. G4	53.00	54.40	54.90	....
St.Louis,del. (inc. tax)	54.65	55.15	55.65	....
Ironton,Utah C11	52.00	52.50	....	....
LoneStar,Tex. L6	48.00	*48.50	48.50	....
Minnequa,Colo. C10	54.00	55.00	55.00	....
Pittsburgh District				
NevilleIsland,Pa. P6	....	52.50	52.50	53.00
Pitts.,N.&S. sides, Ambridge, Aliquippa,del.	....	53.69	53.69	54.19
McKeesRocks,del.	....	53.45	53.45	53.95
Lawrenceville,Homestead, McKeesport,Monaca,del.	....	53.94	53.94	54.44
Verona,del.	....	54.40	54.40	54.90
Brackenridge,del.	....	54.63	54.63	55.13
Bessemer,Pa. U5	52.00	....	52.50	53.00
Clairton,Rankin,So.Duquesne,Pa. U5	52.00	....	....	....
McKeesport,Pa. N3	52.00	....	....	53.00
Monessen,Pa. P7	54.00	....	....	....
Sharpsville,Pa. S6	....	....	52.50	53.00
Steelton,Pa. B2	54.00	54.50	55.00	55.50
Swedeland,Pa. A3	56.00	56.50	57.00	57.50
Toledo,O. I-3	52.00	52.50	52.50	53.00
Cincinnati,del.	57.01	57.51	....	....
Troy,N.Y. R2	54.00	54.50	55.00	55.50
Youngstown District				
Hubbard,O. Y1	52.00	52.50	52.50	....
Youngstown Y1	52.00	52.50	52.50	....
Youngstown U5	52.00	....	....	53.00
Mansfield,O.,del.	56.26	56.76	56.76	57.26

* Low phos, southern grade.

PIG IRON DIFFERENTIALS

Silicon: Add 50 cents per ton for each 0.25% Si over base grade, 1.75-2.25%.

Phosphorus: Deduct 38 cents per ton for P content of 0.70% and over.

Manganese: Add 50 cents per ton for each 0.50% manganese over 1%, or portion thereof.

Nickel: Under 0.50% no extra; 0.50-0.74%, incl., add $2 per ton and each additional 0.25%, add $1 per ton.

BLAST FURNACE SILVERY PIG IRON, Gross Ton

(Base 6.00-6.50% silicon; add $1.50 for each 0.5% Si)

Jackson,O. G2, J1	$62.50
Buffalo H1	63.75

ELECTRIC FURNACE SILVERY PIG IRON, Gross Ton

(Base 14.01-14.50% silicon; add $1 for each 0.5% Si to 18%; $1 for each 0.5% Mn over 1%; $1 for each 0.045% max. P)

NiagaraFalls,N.Y. P15	$83.00
Keokuk,Iowa, Openhearth & Fdry., frt. allowed K2	92.50
Keokuk, OH & Fdry., 12¾ lb piglets, 16% Si, frt. allowed K2	95.50
Wenatchee, Wash., O.H. & Fdry., frt. allowed K2	92.50

CHARCOAL PIG IRON, Gross Ton

(Low phos, semi-cold blast; differential charged for silicon over base grade; also for hard chilling iron Nos. 5 & 6)

Lyles,Tenn. T3	$66.00

LOW PHOSPHOROUS PIG IRON, Gross Ton

Cleveland, intermediate, A7	$57.00
Steelton,Pa. B2	60.00
Philadelphia delivered	63.00
Troy,N.Y. R2	63.00

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Semifinished and Finished Steel Products

Mill prices quoted under GCPR as reported to STEEL, Mar. 22, 1951; cents per pound except as otherwise noted. Changes shown in italics. Code numbers following mill points indicate producing company; key on next two pages.

INGOTS, Carbon, Forging (NT)
Fontana,Calif. K1 ....$79.00
Midland,Pa. U5 .....52.00

INGOTS, Alloy (NT)
Detroit R7 .....$54.00
Fontana,Calif. K1 ....80.00
Houston,Tex. S5 ....62.00
Midland,Pa. C18 .....54.00
Munhall,Pa. U5 .....54.00

BILLETS, BLOOMS & SLABS
Carbon, Rerolling (NT)
Bessemer,Pa. U5 ....$56.00
Clairton,Pa. U5 .....56.00
Ensley,Ala. T2 .....56.00
Fairfield,Ala. T2 .....56.00
Fontana,Calif. K1 ....75.00
Gary,Ind. U5 .....56.00
Johnstown,Pa. B2 ....56.00
Lackawanna,N.Y. B2 ..56.00
Munhall,Pa. U5 .....56.00
So.Chicago,Ill. U5 ...56.00
So.Duquesne,Pa. U5 ..56.00

Carbon, Forging (NT)
Bessemer,Pa. U5 ....$66.00
Buffalo R2 .....66.00
Canton,O. R2 .....66.00
Clairton,Pa. U5 .....66.00
Cleveland R2 .....66.00
Conshohocken,Pa. A3 ..73.00
Detroit R7 .....69.00
Ensley,Ala. T2 .....66.00
Fairfield,Ala. T2 ....66.00
Fontana,Calif. K1 ....85.00
Gary,Ind. U5 .....66.00
Geneva,Utah G1 .....66.00
Houston,Tex. S5 ....74.00
Johnstown,Pa. B2 ....66.00
Lackawanna,N.Y. B2 ..66.00
LosAngeles B3 .....85.00
Munhall,Pa. U5 .....66.00
Seattle B3 .....85.00
So.Chicago R2, U5, W14.66.00
So.Duquesne,Pa. U5 ...66.00
So.SanFrancisco B3 ...85.00

Alloy, Forging (NT)
Bethlehem,Pa. B2 ...$70.00
Buffalo R2 .....70.00
Canton,O. R2 .....70.00
Canton,O.(29) T7 .....66.00
Conshohocken,Pa. A3 ..77.00
Detroit R7 .....73.00
Fontana,Calif. K1 ....89.00
Gary,Ind. U5 .....70.00
Houston,Tex. S5 .....78.00
Ind.Harbor,Ind. Y1 ...70.00
Johnstown,Pa. B2 ....70.00
Lackawanna,N.Y. B2..70.00
LosAngeles B3 .....90.00
Massillon,O. R2 .....70.00
Midland,Pa. C18 .....70.00
Munhall,Pa. U5 .....70.00
So.Chicago R2,U5,W14.70.00
So.Duquesne,Pa. U5 ...70.00
Struthers,O. Y1 .....70.00
Warren,O. C17 .....70.00

ROUNDS, SEAMLESS TUBE (NT)
Canton,O. R2 .....$82.00
Cleveland R2 .....82.00
Fontana,Calif. K1 ...103.00
Gary,Ind. U5 .....82.00
Massillon,O. R2 .....82.00
So.Chicago,Ill. R2 ...82.00
So.Duquesne,Pa. U5 ..82.00

SHEET BARS (NT)
Fontana,Calif. K1 ...$89.00

SKELP
Aliquippa,Pa. J5 .....3.45
Munhall,Pa. U5 .....3.35
Warren,O. R2 .....3.35
Youngstown R2, U5 ...3.35

WIRE RODS
AlabamaCity,Ala. R2 ..4.10
Buffalo W12 .....4.10
Cleveland A7 .....4.10
Donora,Pa. A7 .....4.10
Fairfield,Ala. T2 .....4.10
Fontana,Calif. K1 ....4.90
Houston,Tex. S5 .....4.50
Johnstown,Pa. B2 ....4.10
Joliet,Ill. A7 .....4.10
LosAngeles B3 .....4.90
Minnequa,Colo. C10 ....4.35
Monessen,Pa. P7 .....4.30
No.Tonawanda,N.Y.B11 4.10
Pittsburg,Calif. C11 ....4.75
Portsmouth,O. P12 ....4.30
Roebling,N.J. R5 .....4.20
So.Chicago,Ill. R2 ....4.10
SparrowsPoint,Md. B2 ..4.20
Sterling,Ill.(1) N15 ....4.10
Struthers,O. Y1 .....4.10
Torrance,Calif. C11 ....4.90
Worcester A7 .....4.40

PLATES, Wrought Iron
Economy,Pa. B14 .....8.60

STRUCTURALS
Carbon Steel Stand. Shapes
AlabamaCity,Ala. R2 ..3.60
Aliquippa,Pa. J5 .....3.65
Bessemer,Ala. T2 .....3.65
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fairfield,Ala. T2 .....3.65
Fontana,Calif. K1 .....4.25
Gary,Ind. U5 .....3.65
Geneva,Utah G1 .....3.65
Houston,Tex. S5 .....4.05
Ind.Harbor,Ind. I-2 ....3.65
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.25
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.25
Minnequa,Colo. C10 ....4.10
Munhall,Pa. U5 .....3.65
Niles,Calif.(22) P1 ....4.85
Phoenixville,Pa. P4 ....4.95
Portland,Oreg. O4 .....4.50
Seattle B3 .....4.30
So.Chicago,Ill. U5, W14.3.65
So.SanFrancisco B3 ....4.20
Torrance,Calif. C11 ....4.25
Weirton,W.Va. W6 .....3.90

Alloy Stand. Shapes
Clairton,Pa. U5 .....4.35
Fontana,Calif. K1 .....5.55
Munhall,Pa. U5 .....4.35
So.Chicago,Ill. U5 .....4.35

H.S., L.A. Stand. Shapes
Aliquippa,Pa. J5 .....5.50
Bessemer,Ala. T2 .....5.50
Bethlehem,Pa.(14) B2 ..5.50
Clairton,Pa. U5 .....5.50
Fairfield,Ala. T2 .....5.50
Fontana,Calif. K1 .....6.10
Gary,Ind. U5 .....5.50
Geneva,Utah G1 .....5.50
Ind.Harbor,Ind. I-2 ....5.50
Ind.Harbor,Ind. Y1 .....6.00
Johnstown,Pa. B2 .....5.50
Lackawanna,N.Y.(14)B2 5.50
LosAngeles B3 .....6.05
Munhall,Pa. U5 .....5.50
Seattle B3 .....6.10
So.Chicago,Ill. U5 .....5.50
So.SanFrancisco B3 ....6.00
Struthers,O. Y1 .....6.00

Wide Flange
Bethlehem,Pa. B2 .....3.70
Clairton,Pa. U5 .....3.65
Fontana,Calif. K1 .....4.65
Lackawanna,N.Y. B2 ...3.70
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65

H.S., L.A. Wide Flange
Bethlehem,Pa. B2 .....5.50
Lackawanna,N.Y. B2 ..5.50
Munhall,Pa. U5 .....5.45
So.Chicago,Ill. U5 .....5.45

SHEET STEEL PILING
Ind.Harbor,Ind. I-2 ....4.45
Lackawanna,N.Y. B2 ..4.45
Munhall,Pa. U5 .....4.45
So.Chicago,Ill. U5 .....4.45

BEARING PILES
Munhall,Pa. U5 .....3.65
So.Chicago,Ill. U5 .....3.65

PLATES,High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.65
Bessemer,Ala. T2 .....5.65
Clairton,Pa. U5 .....5.65
Cleveland J5, R2 .....5.65
Conshohocken,Pa. A3 ..5.90
Fairfield,Ala. T2 .....5.65
Fontana,Calif.(30) K1 ..6.25
Gary,Ind. U5 .....5.65
Geneva,Utah G1 .....5.65
Ind.Harbor,Ind. I-2 ....5.65
Ind.Harbor,Ind. Y1 .....6.15
Johnstown,Pa. B2 .....5.65
Munhall,Pa. U5 .....5.65
Pittsburgh J5 .....5.65
Seattle B3 .....6.55
Sharon,Pa. S3 .....5.70
So.Chicago,Ill. U5 .....5.65
SparrowsPoint,Md. B2 ..5.65
Warren,O. R2 .....5.65
Youngstown Y1 .....6.15

PLATES, Open-Hearth Alloy
Claymont,Del. C22 .....4.85
Coatesville,Pa. L7 .....5.25
Conshohocken,Pa. A3 ..5.05
Fontana,Calif. K1 .....5.70
Gary,Ind. U5 .....4.75
Johnstown,Pa. B2 .....4.75
Munhall,Pa. U5 .....4.75
Sharon,Pa. S3 .....5.20
So.Chicago,Ill. U5 .....4.75
SparrowsPoint,Md. B2..4.75

FLOOR PLATES
Cleveland J5 .....4.75
Conshohocken,Pa. A3 ..4.75
Harrisburg,Pa. C5 ....5.95
Ind.Harbor,Ind. I-2 ....4.75
Munhall,Pa. U5 .....4.75
So.Chicago,Ill. U5 .....4.75

PLATES, Carbon Steel
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Ashland,Ky.(15) A10 ..3.70
Bessemer,Ala. T2 .....3.70
Clairton,Pa. U5 .....3.70
Claymont,Del. C22 .....4.15
Cleveland J5, R2 .....3.70
Coatesville,Pa. L7 .....4.15
Conshohocken,Pa. A3 ..4.15
Fairfield,Ala. T2 .....3.70
Fontana,Calif.(30) K1 ..4.30
Gary,Ind. U5 .....3.70
GraniteCity,Ill. G4 .....4.40
Geneva,Utah G1 .....3.70
Harrisburg,Pa. C5 ....4.95
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Minnequa,Colo. C10 ....4.50
Munhall,Pa. U5 .....3.70
Pittsburgh J5 .....3.70
Seattle B3 .....4.60
Sharon,Pa. S3 .....3.95
So.Chicago,Ill. U5, W14.3.70
SparrowsPoint,Md. B2..3.70
Steubenville,O. W10 ....3.70
Warren,O. R2 .....3.70
Weirton,W.Va. W6 .....4.00
Youngstown R2, U5, Y1.3.70

PLATES, Carbon A. R.
Fontana,Calif. K1 .....5.45
Geneva,Utah G1 .....4.85

PLATES, Ingot Iron
Ashland,c.l.(15) A10 ..3.95
Ashland,lcl.(15) A10 ....4.45
Cleveland,c.l. R2 .....4.30
Warren,O. c.l. R2 .....4.30

BARS, Hot-Rolled Carbon
AlabamaCity,Ala. R2 ..3.70
Aliquippa,Pa. J5 .....3.70
Alton,Ill.(1) L1 .....3.95
Atlanta,Ga. A11 .....4.25
Bessemer,Ala. T2 .....3.70
Buffalo R2 .....3.70
Canton,O. R2 .....3.70
Clairton,Pa. U5 .....3.70
Cleveland R2 .....3.70
Detroit R7 .....3.85
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
Lackawanna,N.Y. B2 ..3.70
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
N.Tonawanda,N.Y. B11.3.70
Pittsburg,Calif. C11 ....4.40
Pittsburgh J5 .....3.70
Portland,Oreg. O4 .....4.65
Seattle B3, N14 .....4.45
So.Chicago R2, U5, W14.3.70
So.Duquesne,Pa. U5 ...3.70
So.SanFran.,Cal. B3 ....4.45
Struthers,O. Y1 .....3.70
Torrance,Calif. C11 ....4.40
Weirton,W.Va. W6 ....3.85
Youngstown R2, U5 ....3.70

BAR SIZE ANGLES; S. SHAPES
Aliquippa,Pa. J5 .....3.70
Atlanta A11 .....4.25
Johnstown,Pa. B2 .....3.70
Lackawanna,N.Y. B2 ..3.70
Niles,Calif. P1 .....5.05
Portland,Oreg. O4 .....4.65
SanFrancisco S7 .....4.85

BAR SIZE ANGLES; H.R. CARBON
Bethlehem,Pa. B2 .....3.90

BARS, Hot-Rolled Alloy
Bethlehem,Pa. B2 .....4.30
Buffalo R2 .....4.30
Canton,O. R2 .....4.30
Canton,O.(29) T7 .....3.95
Clairton,Pa. U5 .....4.30
Detroit R7 .....4.45
Ecorse,Mich. G5 .....4.65
Fontana,Calif. K1 .....5.35
Gary,Ind. U5 .....4.30
Houston,Tex. S5 .....4.70
Ind.Harbor,Ind. I-2, Y1.4.30
Johnstown,Pa. B2 .....4.30
KansasCity,Mo. S5 ....4.90
Lackawanna,N.Y. B2 ..4.30
LosAngeles B3 .....5.35
Massillon,O. R2 .....4.30
Midland,Pa. C18 .....4.30
So.Chicago R2, U5, W14.4.30
So.Duquesne,Pa. U5 ...4.30
Struthers,O. Y1 .....4.30
Warren,O. C17 .....4.30
Youngstown U5 .....4.30

BARS, Reinforcing (Fabricators)
AlabamaCity,Ala. R2 ..3.70

BAR SHAPES, Hot-Rolled Alloy
Clairton,Pa. U5 .....4.55
Gary,Ind. U5 .....4.55
Youngstown U5 .....4.55

BARS & SMALL SHAPES, H.R., High-Strength Low-Alloy
Aliquippa,Pa. J5 .....5.55
Bessemer,Ala. T2 .....5.55
Bethlehem,Pa. B2 .....5.55
Clairton,Pa. U5 .....5.55
Cleveland R2 .....5.55
Fairfield,Ala. T2 .....5.55
Fontana,Calif. K1 .....6.60
Gary,Ind. U5 .....5.55
Ind.Harbor,Ind. I-2 ....5.55
IndianaHarbor,Ind. Y1..6.05
Johnstown,Pa. B2 .....5.55
Lackawanna,N.Y. B2 ....5.55
LosAngeles B3 .....6.25
Pittsburgh J5 .....5.55
Seattle B3 .....6.30
So.Duquesne,Pa. U5 ...5.55
So.SanFrancisco B3 ...6.30
Struthers,O. Y1 .....6.05
Youngstown U5 .....5.55

BARS, Cold-Finished Carbon
Ambridge,Pa. W18 ....4.55
BeaverFalls,Pa.M12,R2 .4.55
Buffalo B5 .....4.60
Camden,N.J. P13 .....5.00
Carnegie,Pa. C12 .....4.55
Chicago W18 .....4.55
Cleveland A7, C20 .....4.55
Detroit P17 .....4.70
Donora,Pa. A7 .....4.55
Elyria,O. W8 .....4.55
FranklinPark,Ill. N5 ....4.55
Gary,Ind. R2 .....4.55
GreenBay,Wis. F7 .....4.55
Hammond,Ind. I-2, M13.4.55
Hartford,Conn. R2 .....5.10
Harvey,Ill. B5 .....4.55
LosAngeles R2 .....6.00
Mansfield,Mass. B5 ....5.10
Massillon,O. R2, R8 ....4.55
Monaca,Pa. S17 .....4.55
Newark,N.J. W18 .....5.00
Plymouth,Mich. P5 .....4.55
Pittsburgh J5 .....4.55
Putnam,Conn. W18 .....5.10
Readville,Mass. C14 ....5.10
St.Louis,Mo. M5 .....4.95
So.Chicago,Ill. W14 ....4.55
SpringCity,Pa.(5) K3 ....5.00
Struthers,O. Y1 .....4.55
Waukegan,Ill. A7 .....4.55
Youngstown F3, Y1 ....4.55

BARS, Cold-Finished Alloy
Ambridge,Pa. W18 ....5.40
BeaverFalls,Pa. M12 ....5.40
Bethlehem,Pa. B2 .....5.40
Buffalo B5 .....5.40
Camden,N.J. P13 .....5.80
Canton,O. R2 .....5.40
Canton,O.(29) T7 .....4.90
Carnegie,Pa. C12 .....5.40
Chicago W18 .....5.40
Cleveland A7 .....5.45
Cleveland C20 .....5.40
Detroit P17 .....5.55
Donora,Pa. A7 .....5.45
Elyria,O. W8 .....5.40
Gary,Ind. R2 .....5.40
Hammond,Ind. I-2, M13.5.40
Hartford,Conn. R2 .....5.85
Harvey,Ill. B5 .....5.40
Lackawanna,N.Y. B2 ..5.40
Mansfield,Mass. B5 ....5.85
Massillon,O. R2, R8 ....5.40
Midland,Pa. C18 .....5.40
Monaca,Pa. S17 .....5.40
Newark,N.J. W18 .....5.75
Plymouth,Mich. P5 .....5.60
So.Chicago,Ill. R2, W14.5.40
Struthers,O. Y1 .....5.40
Warren,O. C17 .....5.40
Waukegan,Ill. A7 .....5.45
Worcester,Mass. A7 ....5.75
Youngstown F3, Y1 ....5.40

RAIL STEEL BARS
ChicagoHts.(3,4) I-2, C2.4.75
Franklin,Pa.(3, 4) F5 ...4.75
FortWorth,Tex.(26) T4..5.40
Huntngtn,W.Va.(3) W7 .5.50
Marion,O.(3) P11 .....4.75
Moline,Ill.(3) R2 .....3.80
Tonawanda(3,4) B12 ...4.75
Williamsport(3) S19 ....5.00
Williamsport(4) S19 ....5.10

BARS, Wrought Iron
Dover,N.J.(Staybolt)U1 15.00
Dover,(Eng.Bolt) U1 ...13.50
Dover(Wrgt.Iron) U1 ...12.25
Economy,Pa.(S.R.) B14..9.60
Economy,Pa.(D.R.)B14 11.90
Economy(Staybolt)B14 12.20
McK.Rks.(Staybolt) L5.14.50
McK.Rks.(S.R.) L5 ....9.60
McK.Rks.(D.R.) L5 ....13.00

BARS, Reinforcing (Fabricators)
Alton,Ill.(6) L1 .....3.70
Atlanta A11 .....4.25
Buffalo R2 .....3.70
Cleveland R2 .....3.70
Emeryville,Calif. J7 ....4.45
Fairfield,Ala. T2 .....3.70
Fontana,Calif. K1 .....4.40
Gary,Ind. U5 .....3.70
Houston,Tex. S5 .....4.10
Ind.Harbor,Ind. I-2, Y1.3.70
Johnstown,Pa. B2 .....3.70
KansasCity,Mo. S5 ....4.30
LosAngeles B3 .....4.40
Milton,Pa. B6 .....4.20
Minnequa,Colo. C10 ....4.15
Niles,Calif. P1 .....5.05
Pittsburg,Calif. C11 ....4.30
Seattle B3 .....4.60
Steubenville,O. W10 ....3.60
Torrance,Calif. C11 ....4.30
Warren,O. R2 .....3.60
Weirton,W.Va. W6 .....3.60
Youngstown U5, Y1 ....3.60

SHEETS, H.R. (19 gage)
AlabamaCity,Ala. R2 ..4.75
Dover,O. R1 .....5.65
Ind.Harbor,Ind. I-2 ....5.40
Mansfield,O. E6 .....5.65
Niles,O. N12 .....5.75
Torrance,Calif. C11 ....5.40

SHEETS, H.R (14 ga., heavier) High-Strength Low-Alloy
Cleveland J5, R2 .....5.40
Conshohocken,Pa. A3 ..5.65
Ecorse,Mich. G5 .....5.95
Fairfield,Ala. T2 .....5.40
Fontana,Calif. K1 .....6.35
Gary,Ind. U5 .....5.40
Ind.Harbor,Ind. I-2 ....5.40
IndianaHarbor,Ind. Y1..5.90
Irvin,Pa. U5 .....5.40
Lackawanna(35) B2 ....5.40
Pittsburgh J5 .....5.40
Sharon,Pa. S3 .....5.40
So.Chicago,Ill. U5 .....5.40
SparrowsPoint(36) B2 ..5.40
Warren,O. R2 .....5.40
Weirton,W.Va. W6 .....5.75
Youngstown U5 .....5.40
Youngstown Y1 .....5.90

SHEETS, Cold-Rolled High-Strength Low-Alloy
Cleveland J5, R2 .....6.55
Ecorse,Mich. G5 .....7.10
Fontana,Calif. K1 .....7.50
Gary,Ind. U5 .....6.55
IndianaHarbor,Ind. Y1 .7.05
IndianaHarbor,Ind. I-2 .6.55
Irvin,Pa. U5 .....6.55
Lackawanna(37) B2 ....6.55
Pittsburgh J5 .....6.55
SparrowsPoint(38) B2 ..6.55
Warren,O. R2 .....6.55
Weirton,W.Va. W6 .....6.90
Youngstown Y1 .....7.05

SHEETS, Cold-Rolled Steel (Commercial Quality)

Butler,Pa. A10	4.35
Cleveland J5, R2	4.35
Ecorse,Mich. G5	4.55
Fairfield,Ala. T2	4.35
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	5.30
Gary,Ind. U5	4.35
GraniteCity,Ill. G4	5.05
Ind.Harbor,Ind. I-2, Y1	4.35
Irvin,Pa. U5	4.35
Lackawanna,N.Y. B2	4.35
Middletown,O. A10	4.35
Pittsburg,Calif. C11	5.30
Pittsburgh J5	4.35
SparrowsPoint,Md. B2	4.35
Steubenville,O. W10	4.35
Warren,O. R2	4.35
Weirton,W.Va. W6	4.35
Youngstown Y1	4.35

SHEETS, Galv'd No. 10 Steel

AlabamaCity,Ala., R2	4.80
Ashland,Ky.(8) A10	4.80
Canton,O. R2	4.80
Dover,O. R1	5.50
Fairfield,Ala. T2	4.80
Gary,Ind. U5	4.80
GraniteCity,Ill. G4	5.50
Ind.Harbor,Ind. I-2	4.80
Irvin,Pa. U5	4.80
Kokomo,Ind.(13) C16	5.20
MartinsFerry,O. W10	4.80
Niles,O. N12	6.00
Pittsburg,Calif. C11	5.55
SparrowsPoint,Md. B2	4.80
Steubenville,O. W10	4.80
Torrance,Calif. C11	5.55
Weirton,W.Va. W6	4.80

SHEETS, Galvanized No. 10, High-Strength Low-Alloy

Irvin,Pa. U5	7.20
SparrowsPoint(39) B2	6.75

SHEETS, Galvannealed Steel

Canton,O. R2	5.35
Irvin,Pa. U5	5.35
Kokomo,Ind.(13) C16	5.75
Niles,O. N12	6.55

SHEETS, ZINCGRIP Steel No. 10

Butler,Pa. A10	5.05
Middletown,O. A10	5.05

SHEETS, Electro Galvanized

Cleveland R2 (28)	5.65
Niles,O. R2 (28)	5.65
Weirton,W.Va. W6	5.50

SHEETS, Zinc Alloy

Ind.Harbor,Ind. I-2	5.70

SHEETS, Drum Body

Pittsburg,Calif. C11	4.30
Torrance,Calif. C11	4.30

SHEETS, Well Casing

Fontana,Calif. K1	5.10
Torrance,Calif. C11	5.10

BLUED Stock, 29 Ga.

Yorkville,O. W10	6.80
Follansbee,W.Va.(23)F4	6.85

ROOFING SHORT TERNES (8 lb coated)

Gary,Ind. U5	9.50

MANUFACTURING TERNES (Special Coated)

Fairfield,Ala. T2	$7.60
Gary,Ind. U5	7.50
Irvin,Pa. U5	7.50
SparrowsPoint,Md. B2	7.60
Yorkville,O. W10	7.50

SHEETS, LT. Coated Ternes, 6 lb

Yorkville,O. W10	$8.40

SHEETS, Mfg. Ternes, 8 lb (Commercial Quality)

Gary,Ind. U5	$9.50
Yorkville,O. W10	9.50

SHEETS, LONG Terne Steel (Commercial Quality)

BeechBottom,W.Va.W10	5.20
Gary,Ind. U5	5.20
Mansfield,O. E6	6.05
Middletown,O. A10	5.20
Niles,O. N12	6.00
Weirton,W.Va. W6	5.20

SHEETS, Long Terne, Ingot Iron

Middletown,O. A10	5.60

SHEETS, Enameling Iron

Ashland,Ky.(8) A10	4.65
Cleveland R2	4.65
Gary,Ind. U5	4.65
GraniteCity,Ill. G4	5.35
Ind.Harbor,Ind. I-2	4.65
Irvin,Pa. U5	4.65
Middletown,O. A10	4.65
Youngstown Y1	4.65

Canton,O. R2	5.65	6.10	
Fairfield,Ala. T2	5.60	5.85	
SHEETS, Culvert No. 16	**Cu Alloy**	**Cu Fe**	
Ashland A10	5.60	...	
Gary U5	5.60	5.85	
IndianaHarbor I-2	5.60	5.85	
Irvin,Pa. U5	5.60	5.85	
Kokomo C16	6.25	...	
MartinsFy,O. W10	5.60	5.85	
Pittsburg,Cal. C11	6.35	...	
SparrowsPt. B2	5.60	...	
Torrance,Cal. C11	6.35	...	

SHEETS, Culvert, No. 16 Pure Iron

Ashland,Ky. A10	5.85
Fairfield,Ala. T2	5.85

SHEETS, Hot-Rolled Ingot Iron 18 Gage and Heavier

Ashland(8) A10	3.85
Cleveland R2	4.20
Ind.Harbor,Ind. I-2	3.85
Warren,O. R2	4.20

SHEETS, Cold-Rolled Ingot Iron No. 10 flat

Cleveland R2	4.95
Middletown,O. A10	4.85
Warren,O. R2	4.95

SHEETS, Galvanized Ingot Iron No. 10 flat

Ashland,Ky.(8) A10	5.05
Canton,O. R2	5.55

SHEETS, ZINCGRIP Ingot Iron

Butler,Pa. A10	5.30
Middletown,O. A10	5.30

SHEETS, ALUMINIZED

Butler,Pa. A10	8.15

TIN PLATE, Electrolytic (Base Box)

	0.25 lb	0.50 lb	0.75 lb
Aliquippa,Pa. J5	$7.15	$7.40	$7.80
Fairfield,Ala. T2	7.25	7.50	7.90
Gary,Ind. U5	7.15	7.40	7.80
GraniteCity,Ill. G4	7.35	7.60	8.00
Ind.Harbor,Ind. I-2, Y1	7.15	7.40	7.80
Irvin,Pa. U5	7.15	7.40	7.80
Niles,O. R2	7.15	7.40	7.80
Pittsburg,Calif. C11	7.90	8.15	8.55
SparrowsPoint,Md. B2	7.25	7.50	7.90
Weirton,W.Va. W6	7.15	7.40	7.80
Yorkville,O. W10	7.15	7.40	7.80

SHEETS, SILICON, H.R. or C.R.(22 Ga.) COILS (Cut Lengths ½c lower)

	Field	Arma-ture	Elec-tric	Motor	Dyna-mo
BeechBottom W10 (cut lengths)	...	...	7.25	8.50	9.30
Brackenridge,Pa A4	...	...	7.75	9.00	9.80
GraniteCity,Ill.G4 (cut lengths)	...	...	7.95	9.20	...
Ind.Harbor,Ind. I-2	6.95	7.25	(34)	...	...
Mansfield,O. E6 (cut lengths)	7.10	7.25	7.75	9.00	9.80
Niles,O. N12 (cut lengths)	...	6.75	7.25	...	...
Vandergrift,Pa. U5	...	7.25	7.75	9.00	9.80
Warren,O. R2	6.95	7.25	7.75	9.00	9.80
Zanesville,O. A10	...	7.25	7.75	9.00	9.80

SHEETS, SILICON (22 Ga. Base) Coils (Cut Lengths ½c lower)

Transformer Grade	72	65	58	52
BeechBottom W10 (cut lengths)	9.85	10.40	11.10	11.90
Brackenridge,Pa. A4	10.35	...	...	...
Vandergrift,Pa. U5	10.35	10.90	11.60	12.40
Warren,O. R2	10.35	...	...	...
Zanesville,O. A10	10.35	10.90	11.60	12.40

H.R. or C.R. COILS AND CUT LENGTHS, SILICON (22 Ga.)

	T-100	T-90	T-80	T-73
Butler,Pa. A10 (C.R.)	...	...	14.75	15.25
Vandergrift,Pa. U5	12.90	13.75	14.75	15.25

TIN PLATE, American Coke (Base Box)

	1.25 lb	1.50 lb
Aliquippa J5	$8.45	$8.70
Fairfield,Ala. T2	8.55	8.80
Gary U5	8.45	8.70
Ind.Har. I-2, Y1	8.45	8.70
Irvin,Pa. U5	8.45	8.70
Pitts.,Cal. C11	9.20	9.45
Sp.Pt.,Md. B2	8.55	8.80
Warren R2	8.45	8.70
Weirton W6	8.45	8.70
Yorkville,O. W10	8.45	8.70

BLACK PLATE (Base Box)

Aliquippa,Pa. J5	$6.25
Fairfield,Ala. T2	6.35
Gary,Ind. U5	6.25
GraniteCity,Ill. G4	6.45
Ind.Harbor,Ind. I-2, Y1	6.25
Irvin,Pa. U5	6.25
Niles,O. R2	6.25
Pittsburg,Calif. C11	7.00
SparrowsPoint,Md. B2	6.35
Warren,O. R2	6.25
Weirton,W.Va. W6	6.25
Yorkville,O. W10	6.25

HOLLOWARE ENAMELING Black Plate (29 gage)

Follansbee,W.Va. F4	5.85
Gary,Ind. U5	5.85
GraniteCity,Ill. G4	6.05
Ind.Harbor,Ind. Y1	5.30
Irvin,Pa. U5	5.85
Yorkville,O. W10	6.15

STRIP, Hot-Rolled Alloy

Bridgeprt,Conn.(10) S15	5.45
Carnegie,Pa. S18	5.85
Fontana,Calif. K1	6.70
Gary,Ind. U5	5.50
Houston,Tex. S5	5.90
KansasCity,Mo. S5	6.10
Midland,Pa. C18	5.85
NewBritn,Conn.(10) S15	5.45
Sharon,Pa. S8	5.85
Youngstown U5	5.50

STRIP, Hot-Rolled, High-Strength Low-Alloy

Bessemer,Ala. T2	5.30
Conshohocken,Pa. A3	5.55
Ecorse,Mich. G5	5.95
Fairfield,Ala. T2	5.30
Fontana,Calif. K1	6.20
Gary,Ind. U5	5.30
Ind.Harb.,Ind. I-2	5.30
IndianaHarbor,Ind. Y1	5.30
Lackawanna,N.Y. B2	4.95
LosAngeles(25) B3	6.05
Seattle B3	6.30
Sharon,Pa. S3	5.40
So.SanFrancisco(25) B3	6.05
SparrowsPoint,Md. B2	4.95
Warren,O. R2	5.30
Weirton,W.Va. W6	5.75
Youngstown Y1	5.80
Youngstown U5	5.30

STRIP, Cold-Rolled, High-Strength Low-Alloy

Cleveland J5	6.70
Cleveland A7	6.55
Dover,O. G6	7.30
Fontana,Calif. K1	6.95
Lackawanna,N.Y. B2	6.40
Sharon,Pa. S3	6.55
SparrowsPoint,Md. B2	6.40
Warren,O. R2	6.55
Weirton,W.Va. W6	7.20
Youngstown Y1	7.05

STRIP, Hot-Rolled Carbon

Ala.City,Ala.(27) R2	3.50
Alton,Ill.(1) L1	3.75
Ashland,Ky.(8) A10	3.50
Atlanta A11	4.05
Bessemer,Ala. T2	3.50
Bridgeprt,Conn.(10) S15	4.00
Buffalo(27) R2	3.50
Butler,Pa. A10	3.50
Carnegie,Pa. S18	4.00
Conshohocken,Pa. A3	3.90
Detroit M1	4.40
Ecorse,Mich. G5	3.80
Fairfield,Ala. T2	3.50
Fontana,Calif. K1	4.75
Gary,Ind. U5	3.50
Houston,Tex. S5	4.90
Ind.Harbor,Ind. I-2, Y1	3.50
Johnstown,Pa.(25) B2	3.50
KansasCity,Mo.(9) S5	4.10
Lackawanna,N.Y.(32)B2	3.50
LosAngeles B3	4.25
Milton,Pa. B6	4.00
Minnequa,Colo. C10	4.55
NewBritain(10) S15	4.00
N.Tonawanda,N.Y. B11	3.50
Pittsburg,Calif. C11	4.25
Riverdale,Ill. A1	3.50
SanFrancisco S7	4.85
Seattle B3, N14	4.50
Sharon,Pa. S3	4.00
So.Chicago,Ill. W14	3.50
So.SanFrancisco B3	4.25
SparrowsPoint,Md. B2	3.50
Torrance,Calif. C11	4.25
Warren,O. R2	3.50
Weirton,W.Va. W6	3.60
WestLeechburg,Pa. A4	3.75
Youngstown U5, Y1	3.50

STRIP, Cold-Rolled Alloy Steel

Bridgeprt,Conn.(10)S15	10.75
Carnegie,Pa. S18	10.60
Cleveland A7	10.00
Dover,O. G6	10.50
Fontana,Calif. K1	11.65
Harrison,N.J. C18	10.60
Midland,Pa. C18	10.60

STRIP, Cold-Finished, Spring Steel (Annealed)	0.26-0.40C	0.41-0.60C	0.61-0.80C	0.81-1.05C	1.06-1.35C
Berea, O. C7	...	6.80	7.40	9.35	11.65
Bridgeport,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
Bristol, Conn. W1	...	...	7.70	9.65	...
Carnegie,Pa. S18	...	6.80	7.40	9.35	11.65
Cleveland A7	4.65	6.45	7.40	9.35	11.65
Dearborn,Mich. D3	5.60	7.05	7.65	...	...
Detroit D2	5.60	6.65	7.25	...	...
Dover,O. G6	5.50	6.80	7.40	9.35	11.65
FranklinPark,Ill. T6	5.00	6.60	7.55	9.50	11.80
Harrison,N.J. C18	...	...	7.70	9.65	11.95
Mattapan,Mass. T6	5.50	6.75	7.70	9.65	11.95
NewBritn.,Conn.(10) S15	5.35	6.80	7.40	9.35	11.65
NewCastle,Pa. B4	5.35	6.80	7.40	9.35	...
NewCastle,Pa. E5	5.50	6.80	7.40	9.35	11.65
NewHaven,Conn. D2	5.85	6.75	7.35	...	...
NewYork W3	...	7.10	7.70	9.65	11.95
Pawtucket,R.I. N8: Cleve.-or-Pitts.Base	...	6.80	7.40	9.35	11.65
Worcester,Base	5.85	7.10	7.70	9.65	11.95
Sharon,Pa. S3	5.35	6.80	7.40	9.35	11.65
Trenton,N.J. R5	...	7.10	7.70	9.65	11.95
Wallingford,Conn. W2	5.85	6.75	7.35	9.30	11.60
Weirton,W.Va. W6	5.35	6.80	7.40	9.35	11.65
Worcester,Mass. A7	4.95	6.75	7.70	9.65	11.95
Worcester,Mass. T6	5.50	6.75	7.70	9.65	11.95
Youngstown C8	...	6.80	7.40	9.35	11.65

Spring Steel (Tempered)

Trenton, N. J. R5	...	...	10.30	12.50	15.35
Harrison,N.J. C18	...	...	10.30	12.50	15.35
NewYork, W3	...	...	10.30	12.50	15.35

NewBritn,Conn.(10) S15	10.75
Pawtucket,R.I.(11) N8	10.75
Pawtucket,R.I.(12) N8	11.05
Sharon,Pa. S3	10.60
Worcester,Mass. A7	10.30
Youngstown C8	10.60

STRIP, Cold-Rolled Carbon

Anderson,Ind.(40) G6	5.50
Berea,O. C7	6.60
Bridgeprt,Conn.(10) S15	5.35
Butler,Pa. A10	4.65
Cleveland A7, J5	4.65
Dearborn,Mich. D3	5.60
Detroit D2	5.60
Detroit M1	5.45
Dover,O.(40) G6	5.50
Ecorse,Mich. G5	4.85
Follansbee,W.Va. F4	5.35
Fontana,Calif. K1	6.30
FranklinPark,Ill.(40)T6	4.90
Ind.Harbor,Ind. I-2	4.90
Lackawanna,N.Y. B2	4.65
LosAngeles C1	6.40
Mattapan,Mass. T6	5.50
Middletown,O. A10	4.65
NewBritain(10) S15	5.35
NewCastle,Pa. B4	5.35
NewCastle(40) E5	5.25
NewHaven,Conn. D2	5.85
NewHaven,Conn. A7	5.15
Pawtucket,R.I. R3	6.00
Pawtucket,R.I.(21) N8	5.85
Riverdale,Ill.(40) A1	4.90
Rome,N.Y. R6	5.10
Sharon,Pa. S3	5.35
SparrowsPoint,Md. B2	4.65
Trenton,N.J. R5	6.00
Wallingford,Conn. W2	5.85
Warren,O.(40) T5	5.25
Warren,O. R2	4.65
Weirton,W.Va. W6	4.65
Youngstown C8 (40)	5.25
Youngstown Y1	4.65

STRIP, Electro Galvanized

Dover,O. G6	5.50
Warren,O. T5	5.25
Weirton,W.Va. W6	4.65
Youngstown C8	5.25

Key to Producers

A1 Acme Steel Co.
A3 Alan Wood Steel Co.
A4 Allegheny Ludlum Steel
A7 American Steel & Wire
A8 Anchor Drawn Steel Co.
A9 Angell Nail & Chaplet
A10 Armco Steel Corp.
A11 Atlantic Steel Co.
A13 American Cladmetals Co.

B1 Babcock & Wilcox Tube
B2 Bethlehem Steel Co.
B3 Beth. Pac. Coast Steel
B4 Blair Strip Steel Co.
B5 Bliss & Laughlin Inc.
B6 Boiardi Steel Corp.
B8 Braeburn Alloy Steel
B11 Buffalo Bolt Co.
B12 Buffalo Steel Co.
B14 A. M. Byers Co.

C1 Calif. Cold Rolled Steel
C2 Calumet Steel Div., Borg-Warner Corp.
C4 Carpenter Steel Co.
C5 Central Iron & Steel Div. Barium Steel Corp.
C7 Cleve. Cold Rolling Mills
C8 Cold Metal Products Co.
C9 Colonial Steel Co.
C10 Colorado Fuel & Iron
C11 Columbia Steel Co.
C12 Columbia Steel & Shaft.
C13 Columbia Tool Steel Co.
C14 Compressed Steel Shaft.
C16 Continental Steel Corp.
C17 Copperweld Steel Co.
C18 Crucible Steel Co.
C19 Cumberland Steel Co.
C20 Cuyahoga Steel & Wire
C22 Claymont Steel Corp.

D2 Detroit Steel Corp.
D3 Detroit Tube & Steel
D4 Disston & Sons, Henry
D6 Driver Harris Co.
D7 Dickson Weatherproof Nail Co.

E1 Eastern Gas&Fuel Assoc.
E2 Eastern Stainless Steel
E4 Electro Metallurgical Co.
E5 Elliott Bros. Steel Co.
E6 Empire Steel Corp.

F2 Firth Sterling Steel
F3 Fitzsimons Steel Co.
F4 Follansbee Steel Corp.
F5 Franklin Steel Div., Borg-Warner Corp.
F6 Fretz-Moon Tube Co.
F7 Ft. Howard Steel & Wire
G1 Geneva Steel Co.
G2 Globe Iron Co.
G3 Globe Steel Tubes Co.
G4 Granite City Steel Co.
G5 Great Lakes Steel Corp
G6 Greer Steel Co.

H1 Hanna Furnace Corp.
H4 Heppenstall Co.

I-1 Igoe Bros. Inc.
I-2 Inland Steel Co.
I-3 Interlake Iron Corp.
I-4 Ingersoll Steel Div., Borg-Warner Corp.

J1 Jackson Iron & Steel Co.
J3 Jessop Steel Co.
J4 Johnson Steel & Wire Co.
J5 Jones & Laughlin Steel
J6 Josiyn Mfg. & Supply
J7 Judson Steel Corp.
J8 Jersey Shore Steel Co.

K1 Kaiser Steel Corp.
K2 Keokuk Electro-Metals
K3 Keystone Drawn Steel
K4 Keystone Steel & Wire

L1 Laclede Steel Co.
L2 LaSalle Steel Co.
L3 Latrobe Electric Steel
L5 Lockhart Iron & Steel
L6 Lone Star Steel Co.
L7 Lukens Steel Co.

STRIP, Hot-Rolled Ingot Iron

Ashland,Ky.(8) A10 ...3.75
Warren,O. R2 .....4.10

Strip, Cold-Rolled Ingot Iron

Warren,O. R2 .....5.25

TIGHT COOPERAGE HOOP

Atlanta A11 .....4.05
Riverdale,Ill. A1 .....3.90
Sharon,Pa. S3 .....4.15
Youngstown U5 .....3.75

WIRE, Merchant Quality (6 to 8 gage)

	An'ld	Galv.
AlabamaCity R2	5.70	5.95
Aliquippa J5	5.70	6.15
Atlanta A11	5.95	6.40
Bartonville(19)K4	5.70	6.15
Buffalo W12	4.85	...
Cleveland A7	5.70	6.15
Crawfordsville MS	5.95	6.40
Donora A7	5.70	6.15
Duluth A7	5.70	6.15
Fairfield T2	5.70	6.15
Houston,Tex. S5	6.10	6.55
Johnstown B2	5.70	6.15
Joliet,Ill. A7	5.70	6.15
KansasCy, Mo. S5	6.30	6.75
Kokomo C16	5.80	6.05
LosAngeles B3	6.65	...
Minnequa C10	5.95	6.45
Monessen P7	5.95	6.40
Palmer W12	5.15	...
Pitts.Calif. C11	6.65	6.80
Prtsmth.(18)P12	6.10	6.60
Rankin A7	5.70	6.15
So.Chicago R2	5.70	5.95
So.S.Fran. C10	6.65	7.10
Sparrows Pt. B2	5.80	6.25
Sterling,Ill.(1)N15	5.70	6.15
Struthers,O. Y1	5.70	6.15
Torrance,Cal. C11	6.65	...
Worcester A7	6.00	6.45

WIRE (16 gage)	An'ld Stone	Galv. Stone
Aliquippa J5	10.15	12.15
Bartonville(1) K4	10.25	11.95
Cleveland A7	10.25	12.15
Crawfrdsvle MS	10.30	12.00
Fostoria,O. S1	10.40	13.00
Johnstown B2	10.25	12.15
Kokomo C16	10.25	11.95
Minnequa C10	10.40	12.40
Palmer,Mass. W12	10.25	12.15
Pitts.Cal. C11	10.60	12.50
Prtsmth.(18) P12	10.55	12.30
SparrowsPt. B2	10.35	12.25
Waukegan A7	10.25	12.15

ROPE WIRE

	(A)	(B)
Bartonville,Ill. K4	8.55	8.80
Buffalo W12	8.55	8.80
Cleveland A7	8.55	8.80
Donora,Pa. A7	8.55	8.80
Fostoria,O. S1	8.85	9.10
Johnstown,Pa. B2	8.55	8.80
Monessen,Pa. P16	8.55	8.80
Monessen,Pa. P7	8.80	9.05
NewHaven A7	8.85	8.10
Palmer,Mass. W12	8.85	9.10
Portsmouth,O. P12	8.55	8.80
Roebling,N.J. R5	8.85	9.10
SparrowsPt. B2	8.65	8.90
Struthers,O. Y1	8.55	8.80
Trenton,N.J. A7	8.85	9.10
Waukegan,Ill. A7	8.85	8.80
Worcester J4, T6	8.85	9.10

(A) Plow and Mild Plow.
(B) Improved Plow.

WIRE, Manufacturers Bright, Low Carbon

AlabamaCity,Ala. R2 ...4.85
Aliquippa,Pa. J5 .....4.85
Atlanta A11 .....5.10
Alton,Ill.(1) L1 .....4.85
Bartonville,Ill.(1) K4 ..4.85
Buffalo W12 .....4.85
Chicago W13 .....5.10
Cleveland A7, C20 ....4.85
Crawfordsville,Ind. MS..5.10
Donora,Pa. A7 .....4.85
Duluth,Pa. A7 .....4.85
Fairfield,Ala. T2 .....4.85
Fostoria,O.(24) S1 ....5.35
Houston S5 .....5.25
Johnstown,Pa. B2 .....4.85
Joliet,Ill. A7 .....4.85
KansasCity,Mo. S5 ....5.10
Kokomo,Ind. C16 .....5.10
Monessen,Pa. P7 .....5.10
Newark, 6-8ga. I-1....5.50
No. Tonawanda B11....4.85
Palmer,Mass. W12 ....5.15
Pittsburg,Calif. C11 ....5.80
Portsmouth,O. P12 ....5.25
Rankin,Pa. A7 .....4.85
So.Chicago,Ill. R2 ....4.85
So. SanFrancisco C10 ...5.80
SparrowsPoint,Md. B2 ..4.95
Sterling,Ill.(1) N15 ...4.85
Struthers,O. Y1 .....4.85
Torrance,Calif. C11 ....5.80
Waukegan,Ill. A7 .....4.85
Worcester,Mass. A7, T6..5.15

WIRE, Cold-Rolled Flat

Anderson,Ind. G6 .....6.20
Buffalo W12 .....6.35
Cleveland A7 .....5.85
Crawfordsville,Ind. MS..6.20
Detroit D2 .....6.20
Dover,O. G6 .....6.20
Fostoria,O. S1 .....6.00
Kokomo,Ind. C16 .....5.70
FranklinPark,Ill. T6 ...6.20
Massillon,O. R8 .....5.85
Monessen,Pa. P16 .....5.85
Monessen,Pa. P7 .....6.10
NewHaven,Conn. D2 ....6.50
Pawtucket,R.I.(12) N8..6.85
Trenton,N.J. R5 .....6.15
Worcester A7 .....6.15
Worcester T6 .....6.50
Worcester W12 .....6.65

WIRE, Fine & Weaving(8" Coils)

Bartonville,Ill.(1) K4 ...8.90
Buffalo W12 .....8.90
Chicago W13 .....8.90
Cleveland A7 .....8.90
Crawfordsville,Ind. MS..8.95
Fostoria,O. S1 .....8.90
Johnstown,Pa. B2 .....8.90
Kokomo,Ind. C16 .....8.90
Monessen,Pa. P16 .....8.90
Palmer,Mass. W12 ....9.20
Portsmouth,O. P12 .....8.90
Roebling,N. J. R5 ....9.20
Waukegan,Ill. A7 .....8.90
Worcester,Mass. A7, T6.9.20

WIRE, Galv'd ACSR for Cores

Bartonville,Ill. K4 ....8.50
Monessen,Pa. P16 .....8.50
Roebling,N.J. R5 .....8.80
SparrowsPoint,Md. B2..8.60
Johnstown,Pa. B2 .....8.50

WIRE, Tire Bead

Bartonville,Ill.(1) K4 ..10.90
Monessen,Pa. P16 ....11.40
Roebling,N.J. R5 ....11.55

WIRE, MB Spring, High Carbon

Aliquippa,Pa. J5 .....6.25
Alton,Ill.(1) L1 .....6.25
Bartonville,Ill.(1) K4 ..6.25
Buffalo W12 .....6.25
Cleveland A7 .....6.25
Donora,Pa. A7 .....6.25
Duluth A7 .....6.25
Fostoria,O. S1 .....6.25
Johnstown,Pa. B2 .....6.25
LosAngeles B3 .....7.20
Milbury,Mass.(12) N6 ..8.05
Monessen,Pa. P7, P16..6.25
Palmer,Mass. W12 .....6.55
Pittsburg,Calif. C11 ....7.20
Roebling,N.J. R5 .....6.55
Portsmouth,O. P12 ....6.25
So.Chicago,Ill R2 .....6.25
So.SanFrancisco C10 ...6.85
SparrowsPoint,Md. B2..6.35
Struthers,O. Y1 .....6.25
Trenton,N.J. A7 .....6.55
Waukegan,Ill. A7 .....6.25
Worcester A7, T6, W12..6.55
Worcester,Mass. J4 ....6.75

WIRE, Upholstery Spring

Aliquippa,Pa. J5 .....5.90
Alton,Ill.(1) L1 .....5.90
Buffalo W12 .....5.90
Cleveland, A7 .....5.90
Donora,Pa. A7 .....5.90
Duluth A7 .....5.90
Johnstown,Pa. B2 .....5.90
LosAngeles B3 .....6.55
Monessen,Pa. P7, P16 ..5.90
NewHaven,Conn. A7 ...6.20
Palmer,Mass. W12 ....6.20
Pittsburg,Calif. C11 ...7.10
Portsmouth,O. P12 ....5.90
Roebling,N.J. R5 .....6.20
So.Chicago,Ill. R2 .....5.90
SparrowsPoint,Md. B2 ..6.00
Torrance,Calif. C11 ....7.10
Trenton,N.J. A7 .....6.20
Waukegan,Ill. A7 .....5.90
Worcester,Mass. A7 ....6.20

WOVEN FENCE, 9-15½ Ga. Col.

AlabamaCity,Ala. R2 ...126
Ala.City,Ala.,17-18ga.R2 213
Aliquippa,Pa.9-14½ga.J5 130
Atlanta A11 133
Bartonville,Ill.(19) K4 ..130
Crawfordsville,Ind. MS ..132
Donora,Pa. A7 130
Duluth A7 130
Fairfield,Ala. T2 130
Houston,Tex. S5 138
Johnstown,Pa. B2 130
Johnstown,17ga.,6" B2 ..204
Johnstown,17ga.,4" B2 ..207
Joliet,Ill. A7 130
KansasCity,Mo. S5 142
Kokomo,Ind. C16 132
Minnequa,Colo. C10 138
Monessen,Pa. P7 135
Pittsburg,Calif. C11 153
Portsmouth,O.(18) P12 ..137
Rankin,Pa. A7 130
So.Chicago,Ill. R2 126
Sterling,Ill.(1) N15 130

FENCE POSTS

	Col.
ChicagoHts.,Ill. C2	140
Duluth A7	125
Franklin,Pa. F5	140
Huntington,W.Va. W7	140
Johnstown,Pa. B2	140
Marion,O. P11	140
Minnequa,Colo. C10	130
Moline,Ill. R2	136
So.Chicago R2	140
Tonawanda B12	140
Williamsport,Pa. S19	150

WIRE, Barbed

	Col.
AlabamaCity,Ala. R2	136
Aliquippa,Pa. J5	140
Atlanta A11	143
Bartonville,Ill.(19) K4	143
Crawfordsville MS	145
Donora,Pa. A7	140
Duluth,Minn. A7	140
Fairfield,Ala T2	140
Houston,Tex. S5	148
Johnstown,Pa. B2	140
Joliet,Ill. A7	140
KansasCity, Mo. S5	152
Kokomo,Ind. C16	142
Minnequa,Colo. C10	146
Monessen,Pa. P7	145
Pittsburg,Calif. C11	160
Portsmouth,O.(18) P12	147
Rankin,Pa. A7	140
So.Chicago,Ill. R2	136
So.SanFran.,Calif. C10	160
SparrowsPoint,Md. B2	142
Sterling,Ill.(1) N15	140

BALE TIES, Single Loop

	Col.
AlabamaCity, Ala. R2	123
Atlanta A11	126
Bartonville,Ill.(19) K4	123
Crawfordsville MS	132
Donora,Pa. A7	123
Duluth A7	123
Fairfield,Ala. T2	123
Joliet,Ill. A7	123
KansasCity,Mo. S5	135
Kokomo,Ind. C16	125
Minnequa,Colo. C10	128
Pittsburg,Calif. C11	147
So.Chicago,Ill. R2	123
So.SanFran.,Calif. C10	147
SparrowsPoint,Md. B2	125
Sterling,Ill.(1) N15	123

NAILS & STAPLES, Non-Stock

AlabamaCity,Ala. R2 ..6.10
Bartonville,Ill.(19) K4 ..5.95
Crawfordsville,Ind. MS..6.30
Donora,Pa. A7 .....5.95
Duluth A7 .....5.95
Johnstown,Pa. B2 .....5.95
Joliet,Ill. A7 .....5.95
Kokomo,Ind. C16 .....6.05
Minnequa,Colo. C10 ....6.20
Pittsburg,Calif. C11 ....6.90
Portsmouth,O. P12 ....6.25
Rankin,Pa. A7 .....5.95
So.Chicago,Ill. R2 .....6.10
SparrowsPoint,Md. B2 ..6.05
Sterling,Ill.(1) N15 ....5.65
Worcester,Mass. A7 ....6.25

NAILS, Cut (100 lb keg) To dealers (33)

Conshohocken,Pa. A3..$7.35
Wheeling,W.Va. W10 ..7.15

NAILS & STAPLES, Stock To dealers & mfrs. (7)

	Col.
AlabamaCity,Ala. R2	118
Aliquippa,Pa.(13) J5	118
Atlanta A11	121
Bartonville,Ill.(19) K4	118
Chicago,Ill. W13	118
Cleveland A9	125
Crawfordsville,Ind. MS	122
Donora,Pa. A7	118
Duluth A7	118
Fairfield,Ala. T2	118
Galveston,Tex. D7	126
Houston,Tex. S5	126
Johnstown,Pa. B2	118
Joliet,Ill. A7	118
KansasCity,Mo. S5	130
Kokomo,Ind. C16	120
Minnequa,Colo. C10	123
Monessen,Pa. P7	124
Pittsburg,Calif. C11	137
Portsmouth,O. P12	124
Rankin,Pa. A7	118
So.Chicago,Ill. R2	118
SparrowsPoint,Md. B2	120
Sterling,Ill.(1) N15	118
Torrance,Calif. C11	138
Worcester,Mass. A7	124

STANDARD TRACK SPIKES

Ind.Harbor,Ind. I-2, Y1..6.15
KansasCity,Mo. S5 .....6.40
Lebanon,Pa. B2 .....6.15
Minnequa,Colo. C10 ....6.15
Pittsburgh J5 .....6.15
Seattle B3 .....6.65
So.Chicago,Ill. R2 .....6.15
Struthers,O. Y1 .....6.15
Youngstown R2 .....6.15

TRACK BOLTS (20) Treated

KansasCity,Mo. S5 .....9.85
Lebanon,Pa.(32) B2 ....9.85
Minnequa,Colo. C10 ....9.85
Pittsburgh O3, P14 ....9.85
Seattle B3 .....10.10

TIE PLATES

Fairfield,Ala. T2 .....4.50
Gary,Ind. U5 .....4.50
Ind.Harbor,Ind. I-2 ....4.50
Lackawanna,N.Y. B2 ....4.50
Minnequa,Colo. C10 ....4.50
Pittsburg,Calif. C11 ....4.65
Seattle B3 .....4.65
Steelton,Pa. B2 .....4.50
Torrance,Calif. C11 ....4.65

JOINT BARS

Bessemer,Pa. U5 .....4.70
Fairfield,Ala. T2 .....4.70
Ind.Harbor,Ind. I-2 ....4.70
Joliet,Ill. U5 .....4.70
Lackawanna,N.Y. B2 ....4.70
Minnequa,Colo. C10 ....4.70
Steelton,Pa. B2 .....4.70

AXLES

Ind.Harbor,Ind. S18 ....5.60
Johnstown,Pa. B2 .....5.60

RAILS	Std. No. 1	Std. No. 2	Std. Alt No. 2	TeeRails 60 lb Under
Bessemer,Pa. U5	3.60	3.50	3.55	4.00
Ensley,Ala. T2	3.60	3.50	..	4.00
..	..	..	..	4.00
Fairfield,Ala. T2	..	..	..	..
Gary,Ind. U5	3.60	3.50	3.55	..
Huntington,W.Va. W7	..	..	..	5.00
Ind.Harbor Ind. I-2	3.60	3.50	3.55	..
Johnstown,Pa. B2	..	..	...(16)	4.00
Lackawanna B2	3.60	3.50	...	4.00
Minnequa,Colo. C10	3.60	3.50	...	4.50
Steelton,Pa. B2	3.60	3.50	...	..
Williamsport,Pa. S19	..	..	..	4.75

Key to Producers

M1 McLouth Steel Corp.
M4 Mahoning Valley Steel
M5 Medart Co.
M6 Mercer Tube & Mfg. Co.
M8 Mid-States Steel & Wire
M9 Midvale Co.
M12 Moltrup Steel Products
M13 Monarch Steel Co.
M14 McInnes Steel Co.

N2 National Supply Co.
N3 National Tube Co.
N5 Nelsen Steel & Wire Co.
N6 NewEng.HighCarb.Wire
N8 Newman-Crosby Steel
N12 Niles Rolling Mill Co.
N14 Nrthwst. Steel Roll Mills
N15 Northwestern S.&W. Co.
N16 New Delphos Mfg. Co.

O5 Oliver Iron & Steel Corp.
O9 Oregon Steel Mills

P1 Pacific States Steel Corp.
P2 Pacific Tube Co.
P4 Phoenix Iron & Steel Co.
P5 Pilgrim Drawn Steel
P6 Pittsburgh Coke&Chem.
P7 Pittsburgh Steel Co.
P9 Pittsburgh Tube Co.
P11 Pollak Steel Co.
P12 Portsmouth Division, Detroit Steel Corp.
P13 Precision Drawn Steel
P14 Pitts.Screw & Bolt Co.
P15 Pittsburgh Metallurgical
P16 Page Steel & Wire Div., Amer. Chain & Cable
P17 Plymouth Steel Co.

R1 Reeves Steel & Mfg. Co.
R2 Republic Steel Corp.
R3 Rhode Island Steel Corp.
R5 Roebling's Sons, John A.
R6 Rome Strip Steel Co.
R7 Rotary Electric Steel Co.
R8 RelianceDiv.,EatonMfg.

S1 Seneca Wire & Mfg. Co.
S3 Sharon Steel Corp.
S5 Sheffield Steel Corp.
S6 Shenango Furnace Co.
S7 Simmons Co.
S8 Simonds Saw & Steel Co.
S9 Sloss-Sheffield S.&I. Co.
S13 Standard Forgings Corp.
S14 Standard Tube Co.
S15 Stanley Works
S16 Struthers Iron & Steel
S17 Superior Drawn Steel Co.
S18 Superior Steel Corp.
S19 Sweet's Steel Co.
S20 Southern States Steel
T2 Tenn. Coal, Iron & R.R.
T3 Tenn. Prod. & Chem.
T4 Texas Steel Co.
T5 Thomas Steel Co.
T6 Thompson Wire Co.
T7 Timken Roller Bearing
T9 Tonawanda Iron Div. Am. Rad. & Stan. San.

U1 Ulster Iron Works
U4 Universal Cyclops Steel
U5 United States Steel Co.

V2 Vanadium-Alloys Steel
V3 Vulcan Crucible Steel Co.

W1 Wallace Barnes Co.
W2 Wallingford Steel Co.
W3 Washburn Wire Co.
W4 Washington Steel Corp.
W6 Werton Steel Co.
W7 W. Va. Steel & Mfg. Co.
W8 West.Auto.Mach.Screw
W9 Wheatland Tube Co.
W10 Wheeling Steel Corp.
W12 Wickwire Spencer Steel Div., Colo. Fuel & Iron
W13 Wilson Steel & Wire Co.
W14 Wisconsin Steel Div. International Harvester
W15 Woodward Iron Co.
W18 Wyckoff Steel Co.
Y1 Youngstown Sheet & Tube

TOOL STEEL

Grade	Cents per lb	Grade	Cents per lb
Reg. Carbon	23.00	13.5W,4Cr,3V	140.00
Extra Carbon	27.00	18W,4Cr,2V,9Co	217.50
Spec. Carbon	32.50	19W,4Cr,2V,7Co	217.50
Oil Hardening	35.00	18.25W,4.25Cr,1V 4.75Co	185.50
Cr Hot Wrk	35.00	20.2w,4.25Cr,1.6V,12.25Co	323.00
Hi-Carbon-Cr	63.50	1.5W,4Cr,1V,8.5Mo	78.50
18W,4Cr,1V	123.50	6.4W,4.5Cr,1.9V,5Mo	87.00
18W,4Cr,2V	138.00	6W,4Cr,3V,6Mo	109.50

Tool steel producers include: A4, A8, B2, B8, C4, C9, C13, C18, D4, F2, H4, J3, L3, M14, S8, U4, V2, V3.

(1) Chicago base.
(2) Angles, flats, bands.
(3) Merchant. (4) Reinforcing.
(5) Philadelphia del.
(6) Chicago or Birm. base.
(7) To jobbers, 3 cols. lower.
(8) 16 gage and heavier.
(9) 6 in. and narrower.
(10) Pittsburgh base.
(11) Cleveland & Pittsburgh base.
(12) Worcester, Mass. base.
(13) Add 0.50c for 17 Ga. & heavier.
(14) Also wide flange beams.
(15) ½" and thinner.
(16) 60 lb and under.
(17) Flats only.
(18) To dealers.
(19) Chicago & Pittsburgh base.
(20) Deduct 0.25c for untreated.
(21) New Haven, Conn. base.
(22) Del. San Fran. Bay area.
(23) 88 Ga. 26" wide.
(24) Deduct 0.20c,finer than 15 Ga.
(25) Bar mill bands.
(26) Reinforcing, to fabricators 0.40c; to consumers, 0.15c.
(27) Bar mill sizes.
(28) Bonderized.
(29) Subject to 10% increase.
(30) Sheared; add 0.25c for universal mill.
(31) Not annealed.
(32) I-1 edge or square edge.
(33) To jobbers, deduct 20 cents.
(34) 7.25c for cut lengths.
(35) 72" and narrower.
(36) 54" and narrower.
(37) 15 gage & lighter, 60" & narrower.
(38) 14 gage & lighter, 48" & narrower.
(39) 48" and narrower.
(40) Lighter than 0.035", 0.035" and heavier 0.25c higher.

STANDARD PIPE, T. & C.

BUTTWELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Black A	Black B	Black C	Galvanized D	Galvanized E	Galvanized F
⅛	5.50	0.24	34.0	32.0	25.0	1.5	+0.5	+2.5
¼	6.0	0.42	28.5	26.5	23.5	+1.0	+3.0	+6.0
⅜	6.0	0.57	23.5	21.5	18.5	+7.0	+9.0	+12.0
½	8.5	0.85	36.0	34.0	35.0	14.0	12.0	13.0
¾	11.5	1.13	39.0	37.0	38.0	18.0	16.0	17.0
1	17.0	1.68	41.5	39.5	40.5	21.5	19.5	20.5
1¼	23.0	2.28	42.0	44.0	41.0	22.0	24.0	21.0
1½	27.5	2.78	42.5	41.5	41.5	23.0	21.5	22.0
2	37	3.68	43.0	41.0	42.0	23.5	21.5	22.5
2½	53.0	5.82	43.5	41.5	42.5	24.0	22.0	23.0
3	76.0	7.62	43.5	41.5	42.5	24.0	22.0	23.0

Column A: Etna, Pa. N2; Butler, Pa. ⅛-⅜", F6; Benwood, W. Va., 3½ points lower on ⅛", 1½ points lower on ¼", and 2 points lower on ⅜", W10; Sharon, Pa. M6, 1 point higher on ⅜", 2 points lower on ¼" and ⅜". Following make ½" and larger: Lorain, O., N3; Youngstown R2 and 36¼% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5; Fontana, Calif. K1 quotes 11½ points lower on ½" and larger continuous weld and 24½ on 3½" and 4".

Columns B & E: Sparrows Point, Md. B2.

Columns C & F: Indiana Harbor, Ind., ½" through 3", Y1; Alton, Ill. (Gary base) L1.

Column D: Butler, Pa. F6, ⅛-⅜"; Benwood, W. Va. W10, except plus 3½% on ⅛", plus 2½% on ¼" plus 9% on ⅜"; Sharon, Pa. M6, plus 0.5 on ⅜". 1 point lower on ½", ¾", 1½ points lower on 1" and 1¼", 2 points lower on 1½", 2", 2½" and 3". Following quote only on ½" and larger: Lorain, O. N3; Youngstown R2, and 16½% on 3½" and 4"; Youngstown Y1; Aliquippa, Pa. J5 quotes 1 point lower on ¾", 2 points lower on 1", 1½ points lower on 1¼", 2 points lower on 1½" and 2", 1½ points lower on 2½" and 3"; Etna, Pa. N2 and 18½% on 3½" and 4".

SEAMLESS AND ELECTRIC WELD Size Inches	List Per Ft	Pounds Per Ft	Carload Discounts from List, % Seamless Black A	Seamless Galv. B	Elec. Weld Black C	Elec. Weld Galv. D
2	37.00	3.68	29.5	9.5	29.5	9.5
2½	58.5	5.82	32.5	12.5	32.5	12.5
3	76.5	7.62	32.5	12.5	32.5	12.5
3½	92.0	9.20	34.5	14.5	34.5	14.5
4	$1.09	10.89	34.5	14.5	34.5	14.5
5	1.48	14.81	37.0	17.0	37.0	17.0
6	1.92	19.18	37.0	17.0	37.0	17.0

Column A: Aliquippa J5; Ambridge N2; Lorain N3; Youngstown Y1.

Column B: Aliquippa J5 quotes 1½ pts lower on 2", 1 pt lower on 2½-6 in., Lorain, N3; Youngstown Y1.

Columns C & D: Youngstown R2.

BOILER TUBES

Net base r.l. prices, dollars per 100 ft, mill; minimum wall thickness, cut lengths 10 to 24 ft, inclusive.

O.D. In.	B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
1	13	13.45	16.47	15.36	15.36
1¼	13	16.09	19.71	15.61	18.19
1½	13	17.27	21.15	17.25	20.30
1¾	13	19.29	23.62	19.62	23.09
2	13	21.62	26.48	21.99	25.86
2¼	13	24.35	29.82	24.50	28.84
2¼	12	26.92	32.97	26.98	31.76
2½	12	29.65	36.32	29.57	34.76
2¾	12	32.11	39.33	31.33	36.84
3	12	34.00	41.64	32.89	38.70

CLAD STEELS

(Cents per pound)

Cladding Stainless	Plates 10%	Plates Carbon Base 20%	Strip Cold-Rolled Carbon Base 10%	Strip Both Sides	Sheets Carbon Base 10%	Sheets Carbon Base 20%	Sheets Cu Base Both Sides
302	.....	.....	.....	.....	19.75	27.50	77.00
304	25.00	28.00	.....	.....	20.75	27.50	77.00
		29.50			24.50		
309	30.50	35.00	.....	.....	.....	.....	.....
310	36.50	41.00	.....	.....	.....	.....	144.00
316	29.50	31.50	.....	.....	26.00	36.50	.....
		34.00					
317	34.50	39.00	.....	.....	.....	.....	.....
318	38.50	38.00	.....	.....	.....	.....	.....
321	26.50	31.00	.....	.....	23.00	33.00	111.00
347	27.50	30.50	.....	.....	24.00	33.50	130.00
		32.00					
405	24.25	27.75	.....	.....	.....	.....	.....
410	20.75	27.25	.....	.....	.....	.....	.....
Nickel	33.25	44.25	41.00	54.00	.....	.....	.....
Inconel	41.00	53.50	.....	.....	.....	.....	165.00
Monel	34.75	45.75	.....	.....	.....	.....	.....
Copper*	.....	.....	23.70†	29.65‡	.....	.....	.....

* Deoxidized. † 20.20c for hot-rolled. ‡ 26.40c for hot-rolled. Production points for carbon base products: Stainless plates, sheet, Conshohocken, Pa. A3 and New Castle, Ind. I-4; stainless-clad plates, Claymont, Del. W16, Coatesville, Pa. I-7 and Washington, Pa. J3; nickel, inconel, monel-clad plates, Coatesville I-7; nickel, monel, copper-clad strip, Carnegie, Pa., S18. Production point for copper-base sheets is Carnegie, Pa. A13.

BOLTS, NUTS

CARRIAGE, MACHINE BOLTS

(F.o.b. midwestern plants; per cent off list for less than case lots to consumers)

6 in. and shorter:
- ½-in. & smaller diam. 15
- ⅝-in. & ¾-in. 18.5
- ⅞-in. and larger 17.5

Longer than 6 in.: 14

All diams.:

Lag bolts, all diams.:
- 6 in. and shorter 23
- over 6 in. long 21

Ribbed Necked Carriage 18.5

Blank 34

Plow 34

Step, Elevator, Tap, and Sleigh Shoe 21

Tire bolts 12

Boiler & Fitting-Up bolts 31

NUTS

	Reg.	Heavy
H.P. & C.P. Square:		
½-in. & smaller	15	15
⅝-in. & ¾-in.	12	6.5
⅞-in.-1½-in.	9	1
1⅝ in. & larger	7.5	1
H.P. Hex.:		
½-in. & smaller	26	22
⅝-in. & ¾-in.	16.5	6.5
⅞-in.-1½-in.	12	2
1⅝ in. & larger	8.5	2
C.P. Hex.		
½-in. & smaller	26	22
⅝-in. & ¾-in.	23	17.5
⅞-in. & 1½-in.	19.5	12
1⅝-in. & larger	12	6.5

SEMIFINISHED NUTS

American Standard

(Per cent off list for less than case or keg quantities)

	Reg.	Hvy.
½-in. & smaller	35	28.5
⅝-in. & ¾-in.	29.5	22
⅞-in.-1½-in.	24	15
1⅝-in. & larger	13	8.5
		Light
⅞-in. & smaller		35
1-in. to ⅝-in.		28.5
¾-in. to 1½-in.		26

STEEL STOVE BOLTS

(F.o.b. plant; per cent off list in packages)

Plain finish ..... 48 & 10

Plated finishes ... 31 & 10

HEXAGON CAP SCREWS

(1020 steel; packaged; per cent off list)

6 in. or shorter:
- ⅝-in. & smaller 42
- ¾-in. through 1 in. .. 34

Longer than 6 in.:
- ⅝-in. & smaller 26
- ¾-in. through 1 in. 4

SQUARE HEAD SET SCREWS

(Packaged; per cent off list)

1 in. diam. x 6 in. and shorter 38

1 in. and smaller diam. x over 6 in. 26

HEADLESS SET SCREWS

(Packaged; per cent off list)

No. 10 and smaller 35

¼-in. diam. & larger.... 16

N.F. thread, all diams... 10

RIVETS

F.o.b. midwestern plants

Structural ½-in., larger 7.85c

⅜-in. under ..... 36 off

WASHERS, WROUGHT

F.o.b. shipping point, to jobbers ..List to list-plus-50c.

ELECTRODES

(Threaded, with nipples, unboxed, f.o.b. plant)

GRAPHITE

Diam. Inches	Length	Cents per lb
17,18,20	60,72	17.85
7 to 16	48,60,72	17.85
7	48,60	19.57
6	48,60	20.95
4.5⅛	40	21.50
3	40	22.61
2½	24,30	23.15
2	24,30	25.36

CARBON

40	100,110	8.03
35	100,110	8.03
30	84,110	8.03
24	72 to 104	8.03
17 to 20	34,90	8.03
14	60,72	8.57
10,12	60	8.84

STAINLESS STEEL

Type	Sheets	C.R. Strip	Bars Wire Structurals
301...	41.00	34.00	31.25
302†...	41.00	36.50	31.25
303...	43.00	40.00	33.75
304...	43.00	38.50	32.75
309...	55.50	54.50	44.25
316...	56.50	58.50	48.75
321...	49.00	48.00	39.75
347...	53.50	52.00	41.25
410...	36.50	30.50	25.75
416...	37.00	37.00	26.25
420...	44.00	47.00	31.25
430...	39.00	31.00	26.25
501...	27.50	26.00	14.25
502...	28.50	27.00	15.25

Baltimore, Types 301 through 347 sheet, except 309 E2.

Brackenridge, Pa., sheets A4.

Bridgeville, Pa., bars, wire, sheets & strip U4.

Butler, Pa., sheets and strip except Types 303, 309, 416, 420, 501 & 502 A10.

Carnegie, Pa., sheets and strip except Types 303, 416, 501 & 502, S18.

Cleveland, strip A7.

Detroit, strip, except Types 309, 321, 416, 420, 501 and 502 M1.

Dunkirk, N.Y., bars, wire A4.

Duquesne, Pa., bars U5.

Fort Wayne, Ind., bars and wire, except Type 501 & 502 J6.

Gary, Ind., sheets except Type 416 U5.

Harrison, N. J., strip C18.

McKeesport, Pa., bars, sheets except Type 416 U5.

McKeesport, Pa., bars & wire except Types 301, 309, 501 & 502; strip Types 410 & 430 only F2.

Middletown, O., sheets and strip except Types 303, 416, 420, 501 and 502 A10.

Midland, sheets & strip C18.

Munhall, Pa., bars U5.

Pittsburgh, sheets C18.

Reading, Pa., bars and strip, except 55.50c for Type 309 strip and 44.75c for Type 309 bars, C4.

Sharon, Pa., strip, except Types 303, 309, 316, 416, 501 and 502 S3.

So. Chicago, Ill., bars & structurals U5.

Syracuse, N. Y., bars, wire & structurals C18.

Titusville, Pa., bars, U4.

Wallingford, Conn., strip, except 309, W2 quotes 0.25 cents higher.

Washington, Pa., bars, sheets & strip, except Type 309 sheets 56.00c and bars 44.75c, J3.

Washington, Pa., Types 301 through 347 sheets & strip as listed except 303 & 309; 316 sheets 61.50c, strip 63.00c, W4.

Watervliet, N. Y., structurals & bars A4.

Waukegan, bars & wire A7.

West Leechburg, Pa., strip, A4.

Youngstown, strip, except Types 303, 309, 316, 416, 501 and 502 C8.

COAL CHEMICALS

Spot, cents per gallon, ovens

Pure benzol 30.00-35.00

Toluol, one deg...26.00-33.00

Industrial xylol ...25.00-33.50

Per ton bulk, ovens

Sulphate of ammonia $32-$45

Cents per pound, ovens

Phenol, 40 (carlots, non-returnable drums) ..17.25

Do., less than carlots..18.00

Do., tank cars 15.50

FLUORSPAR

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective CaF_2 content, 70%, $43; 60%, $40.

Imported, net ton, duty paid, metallurgical grade, $33-$35.

MORE

METAL POWDERS

(Per pound, f.o.b. shipping point in ton lots for minus 100 mesh, except as otherwise noted.)

	Cents
Sponge iron	
98+% Fe, carlots	15.00
Swedish, c.i.f. New York, in bags	10-15.00
Electrolytic Iron:	
Annealed, 99.5+% Fe	32.50
Unannealed, 99+% Fe	30.00
Unannealed, 99+% Fe minus 325 mesh	38.50
Powder Flakes	48.50
Carbonyl Iron:	
97.9-99.8% size 5 to 10 microns	83.00-148.00
Aluminum:	
Carlots, freight allowed	25.00
Atomized, 500 lb drums, freight allowed	32.50
Brass, 10-ton lots	30.00-32.50
Bronze, 10-ton lots	51.25-60.00
Phosphor-Copper, 10 tons	50.00
Copper:	
Electrolytic	33.25
Reduced	33.75-35.00
Lead	23.50
Manganese:	
Minus 100-mesh	57.00
Minus 35 mesh	52.00
Minus 200 mesh	62.00
Nickel unannealed	85.00
Nickel-Silver, 10-ton lots	41.00
Silicon	38.50
Solder (plus cost of metal)	5.50
Stainless Steel, 302	85.00
Tin	$1.365
Zinc, 10-ton lots	23.00-30.00
Tungsten:	Dollars
99%, minus 80 to 200 mesh, freight allowed	
1000 lb and over	4.00
Less than 1000 lb	4.50
98.8% minus 65 mesh, freight allowed:	
1000 lb. and over	4.15
less than 1000 lb.	4.25
Molybdenum:	
99%, minus 80 to 200 mesh	
over 500 lb.	2.85
200 to 500 lb.	3.10
less than 200 lb	3.25
Chromium, electrolytic 99% Cr min.	3.50

METALLURGICAL COKE

Price per net ton

BEEHIVE OVENS

Connellsvll.fur.	$14.50-15.00
Connellsvll.fdry.	17.00-18.00
New River, foundry	19.50
Wise county, foundry	15.50
Wise county, furnace	15.20

OVEN FOUNDRY COKE

Kearney, N. J., ovens	$22.75
Everett, Mass., ovens	
New England, del.	24.50
Chicago, ovens	21.00
Chicago, del.	22.45
Detroit, del.	24.91
Terre Haute, ovens	22.50
Milwaukee, ovens	23.75
Indianapolis, oven	22.75
Chicago, del.	26.62
Cincinnati, del.	25.67
Detroit, del.	26.65
Ironton, O., ovens	21.50
Cincinnati, del.	24.06
Painesville, O., ovens	24.00
Cleveland, del.	23.72
Erie, Pa., ovens	23.50
Birmingham, ovens	20.30
Birmingham, del.	21.69
Philadelphia, ovens	22.70
Nevillelsland, Pa., ovens	23.00
Swedeland, Pa., ovens	22.00
St. Louis, ovens	24.25
St. Louis, del.	23.58
Portsmouth, O., ovens	21.50
Cincinnati, del.	24.06
Detroit, ovens	*25.00
Detroit, del.	*25.00
Buffalo, del.	26.69
Flint, del.	26.44
Pontiac, del.	24.39
Saginaw, del.	26.75

Includes representative switching charge of: *, $1.00; †, $1.45; one-track charge being $1.20, two tracks $1.40, and three or more tracks $1.50. ‡ Or within $4.15 freight zone from works.

WAREHOUSE STEEL PRODUCTS

(Prices, cents per pound, for delivery within switching limits, subject to extras)

	SHEETS			STRIP		BARS			Standard Structural Shapes	PLATES	
	H.R. 18 Ga., Heavier*	C.R.	Gal. 10 Ga.†	H.R.*	C.R.*	H.R. Rds.	C.F. Rds.	H.R. Alloy 4140§		Carbon	Floor
New York (city)	6.27	7.29	8.44	6.59	...	6.42	7.29	9.25	6.40	6.58	8.04
New York (c'try)	5.97	6.99	8.14	6.29	...	6.12	6.99	8.95	6.10	6.28	7.74
Boston (city)	6.40	7.20	8.49	6.35	...	6.25	7.04	9.25	6.40	6.98	7.88
Boston (c'try)	6.20	7.00	8.29	6.15	...	6.05	6.84	9.05	6.20	6.78	7.68
Phila. (city)	7.15	7.05	8.25	6.35	...	6.30	7.11	8.90	6.15	6.30	7.40
Phila. (c'try)	6.90	6.80	8.00	6.10	...	6.05	6.86	8.65	5.90	6.05	7.15
Bal. (city)	5.80	7.04	8.27	6.24	...	6.24	7.09	...	6.34	6.00	7.64
Bal. (c'try)	5.60	6.84	8.07	6.04	...	6.04	6.89	...	6.14	5.80	7.44
Norfolk, Va.	6.50	...	...	6.70	...	6.55	7.70	...	6.60	6.50	8.00
Richmond, Va.	5.90	...	8.10	6.10	...	6.10	6.90	...	6.30	6.05	7.80
Wash. (w'hse)	6.02	7.26	8.49	6.46	...	6.46	7.26	...	6.56	6.22	7.86
Buffalo (del.)	5.80	6.60	8.29	6.06	...	5.80	6.65	10.65††§	6.00	6.25	7.55
Buffalo (w'hse)	5.60	6.40	8.09	5.86	...	5.60	6.45	10.45††§	5.80	6.05	7.35
Pitts. (w'hse)	5.60	6.40*	7.75	5.65-5.95	6.90	5.55	6.40	10.10††	5.70	5.75	7.00
Detroit (w'hse)	5.45-5.78	6.53-6.80	7.99	5.94-5.95	7.75	5.84	6.56	8.91	6.09	6.19-6.35	7.28
Cleveland (del.)	5.80	6.60	8.30	5.89	7.10	5.77	6.60-6.70	8.91	10.02	6.12	7.32
Cleve. (w'hse)	5.60	6.40	8.10	5.69	6.90	5.57	6.40-6.50	8.71	5.82	5.92	7.12
Cincin. (city)	6.02	6.59	7.34	5.95	...	5.95	6.51	...	6.24	6.34	7.50
Chicago (city)	5.80	6.60	7.95	5.75	...	5.75	6.50	10.30	5.90	6.00	7.20
Chicago (w'hse)	5.60	6.40	7.75	5.55	...	5.55	6.30	10.10	5.70	5.80	7.00
Milwaukee (city)	5.94	6.74	8.09	5.89	...	5.89	6.74	10.44	6.04	6.14	7.34
Milwau. (c'try)	5.74	6.54	7.89	5.69	...	5.69	6.54	10.24	5.84	5.94	7.14
St. Louis (del.)	5.68	6.48	7.28	5.63	...	5.63	6.28	10.08††§	5.78	5.93	7.13
St. L. (w'hse)	5.48	6.28	7.08	5.43	...	5.43	6.08	9.88††§	5.58	5.73	6.93
Kans. City (city)	6.40	7.20	8.40	6.35	...	6.35	7.20	...	6.50	6.60	7.80
KansCity (w'hse)	6.20	7.00	8.20	6.15	...	6.15	7.00	...	6.30	6.40	7.60
Omaha, Nebr.	6.13‡	...	8.33	6.13	...	6.18	6.98	...	6.18	6.38	7.83
Birm'hm (city)	5.75	6.55	6.90‡	5.70	...	5.70	7.53	...	5.85	6.10	8.25
Birm'hm (w'hse)	5.60	6.40	6.75‡	5.55	...	5.55	7.53	...	5.70	5.95	8.23
Los Ang. (city)	6.55	8.10	9.05§	6.60	8.90	6.55	7.75	...	6.55	6.60	9.20
L. A. (w'hse)	6.35	7.95	8.85§	6.40	8.70	6.35	7.55	...	6.35	6.40	8.70
San Francisco	6.65	7.80§	8.90§	6.60	...	6.45	8.20	...	6.45	6.50	8.60
Seattle-Tacoma	7.05	8.60§	9.20§	7.30	...	6.75	9.10	11.15	6.65	6.75	8.80

* Prices do not include gage extras; † prices include gage and coating extras, except Birmingham (coating extra excluded) and Los Angeles (gage extra excluded); ‡ includes extra for 10 gage; § as rolled; †† as annealed. Base quantities, 2000 to 9999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold-finished bars, 2000 lb and over; 2—500 to 1499 lb; 3—450 to 1499 lb; 4—3500 lb and over; 5—1000 to 1999 lb.

REFRACTORIES

FIRE CLAY BRICK

Super Duty: St. Louis, Vandalia, Farber, Mexico, Mo., Olive Hill, Hayward, Ashland, Ky., Clearfield, Curwensville, Pa., Ottawa, Ill., $116.60. Hard-fired, St. Louis, Vandalia, Mo., Olive Hill, Ky., $156.20.

High-Heat Duty: Salina, Pa. $99.60. Woodbridge, N. J., St. Louis, Farber, Vandalia, Mexico, Mo., West Decatur, Orviston, Clearfield, Beach Creek, Curwensville, Lumber, Lockhaven, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Ky., Troup, Athens, Tex., Stevens Pottery, Ga., Bessemer, Ala., Portsmouth, Oak Hill, O., Ottawa, Ill., $94.60.

Intermediate-Heat Duty: St. Louis, Farber, Vandalia, Mo., West Decatur, Orviston, Beach Creek, Curwensville, Lumber, Lockhaven, St. Marys, Clearfield, Pa., Olive Hill, Hitchins, Haldeman, Ashland, Hayward, Ky., Athens, Troup, Tex., Stevens Pottery, Ga., Portsmouth, O., Ottawa, Ill., $88; Bessemer, Ala., $79.20.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Orviston, Pa., $79.20; Parral, O., $78.50; St. Marys, Pa., $76; Ottawa, Ill., $70.

LADLE BRICK

Dry Press: Chester, New Cumberland, W. Va., Freeport, Merill Station, Clearfield, Pa., Irondale, Wellsville, O., $66.

Wire Cut: Chester, Wellsville, O., $64.

MALLEABLE BUNG BRICK

St. Louis, Vandalia, Farber, Mo., Olive Hill, Ky., $105.60; Beach Creek, Pa., $94.60; Ottawa, Ill., $90.

SILICA BRICK

Mt. Union, Claysburg, or Sproul, Pa., Portsmouth, O., Ensley, Ala., $94.60; Hays, Pa., $100.10; Joliet, Rockdale, Ill., E. Chicago, Ind., $104.50; Lehi, Utah, Los Angeles, $111.10.

Eastern Silica Coke Oven Shapes (net ton): Claysburg, Mt. Union, Sproul, Pa., Birmingham, $92.40.

Illinois Silica Coke Oven Shapes (net ton): Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $93.50.

BASIC BRICK

Per net ton, Baltimore or Chester, Pa. Burned chrome brick, $73-$78; chemical-bonded chrome brick, $77-$82; magnesite brick, $99-$104; chemical-bonded magnesite, $88-$93.

MAGNESITE

Per net ton, Chewelah, Wash. Domestic deadburned, ⅜" grains; bulk, $36.30; single paper bags, $41.80.

DOLOMITE

Per net ton. Domestic, burned bulk; Bonne Terre, Mo., $12.15; Martin, Millersville, Nario, Clay Center, Woodville, Gibsonburg, Bettsville, O., Billmeyer, Plymouth Meeting, Blue Bell, Williams, Pa., Millville, W. Va., $13.

ORES

LAKE SUPERIOR IRON ORE

Gross ton, 51½% (natural), lower lake ports.

After adjustment for analysis, prices will be increased or decreased as the case may be for increases or decreases after Dec. 2, 1950, in applicable lake vessel rates, upper lake rail freights, dock handling charges and taxes thereon.

Old range bessemer	$8.70
Old range nonbessemer	8.55
Mesabi bessemer	8.45
Mesabi nonbessemer	8.30
High phosphorus	8.30

EASTERN LOCAL ORE

Cents per unit, del. E. Pa.

Foundry and basic 56-62% concentrates contract	17.00

FOREIGN ORE

Cents per unit, c.i.f. Atlantic ports

Swedish basic, 60 to 68%:	
Spot	17.00
Long-term contract	15.00
North African hematites	15.75
Brazilian iron ore, 68-69%	18.00

TUNGSTEN ORE

Net ton unit, duty paid

Foreign wolframite and scheelite, per net ton unit	$38-$39
Domestic scheelite, del.	nominal

MANGANESE ORE

Indian manganese, 46-48%, nearby, 92.00-96.00c per long ton unit, c.i.f. U. S. ports, duty for buyer's account; shipments against old contracts for 48% ore are being received from some sources at 79.8-81.8c.

CHROME ORE

Gross ton, f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S. C., plus ocean freight differential for delivery to Portland, Oreg., or Tacoma, Wash.

Indian and African	
48% 2.8:1	$32.50
48% 3:1	35.00-36.00
48% no ratio	26.00
South African Transvaal	
44% no ratio	$24.00-25.00
45% no ratio	20.00
48% no ratio	31.00-32.00
50% no ratio	28.00-28.50
Brazilian	
44% 2.5:1 lump	$32.00
Rhodesian	
45% no ratio	$20.00-21.00
48% no ratio	26.00
48% 3:1 lump	35.00-36.00
Domestic—rail nearest seller	
48% 3:1	$39.00

MOLYBDENUM

Sulphide concentrates per lb. molybdenum content, mines	$0.90

FERROALLOYS

MANGANESE ALLOYS

Spiegeleisen: (19-21% Mn, 1-3% Si). Carlot per gross ton, $75, Palmerton, Pa.; $75, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

Standard Ferromanganese: (Mn 78-82%, C 7% approx.) Carload, lump, bulk $185 per gross ton of alloy, c.l. packed, $197; gross ton lots, packed, $212; less gross ton lots, packed, $229; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., Welland, Ont., or Ashtabula, O. Base price: $187, Johnstown, Pa.; $185, Sheridan, Pa.; $188, Etna, Pa.; $190, Chattanooga, Tenn. Shipment from Pacific Coast warehouses by one seller add $33 to above prices, f.o.b. Los Angeles, Oakland, Portland, Oreg. Shipment from Chicago warehouse, ton lots $227; less gross ton lots, $244 f.o.b. Chicago. Add or subtract $2.30 for each 1% or fraction thereof, of contained manganese over 82% and under 78%, respectively.

Low-Carbon Ferromanganese, Regular Grade: (Mn 85-90%). Carload, lump, bulk, max. 0.07% C, 25.75c per lb of contained Mn, carload packed 26.5c, ton lot 27.6c, less ton 28.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 75% C—max. 7% Si. **Special Grade:** (Mn 90% min., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

Medium-Carbon Ferromanganese: (Mn 80-85%, C 1.5% max.). Carload, lump, bulk 19.15c per lb of contained Mn, carload packed 19.9c, ton lot 21.0c, less ton 22.2c. Delivered. Spot, add 0.25c.

Manganese Metal, 2" x D (Mn 96% min., Fe 2% max., Si 1% max., C 0.2% max.): Carload lump bulk, 34c per lb of metal; packed, 34.75c; ton lot 36.25c; less ton lot 38.25c. Delivered. Spot, add 2c.

Manganese Electrolytic: 250 lb to 1999 lb, 32c; 2000 to 39,999 lb, 30c; 40,000 lb or more, 29c. Premium for hydrogen-removed metal 1.5c per pound, f.o.b. cars Knoxville, Tenn. Freight allowed to St. Louis or to any point east of Mississippi.

Silicomanganese: (Mn 65-68%). Contract, lump bulk, 1.50% C grade, 18-20% Si 9.90c per lb of alloy, carload packed, 10.65c, ton lot 11.55c, less ton 12.55c. Freight allowed. For 2% C grade, Si 15-17%, deduct 0.2c from above prices. For 3% C grade, Si 12-14.5%, deduct 0.5c from above prices. Spot, add 0.25c.

CHROMIUM ALLOYS

High-Carbon Ferrochrome: Contract, cl., lump, bulk 21.75c per lb of contained Cr, c.l., packed 22.65c, ton lot 23.80c, less ton 25.20c. Delivered. Spot, add 0.25c.

"SM" Ferrochrome: (Cr 60-65% Si 4-6%, Mn

(Please turn to page 159)

The Metal Market

Improvement in copper supply will follow suspension of import duty and issuance of red metal scrap price regulation. Restrictions on consumption will continue

LARGER tonnages of copper will be available to domestic consumers next quarter, possibly as early as April. Supply will be large enough to cover only defense and essential civilian requirements, however, requiring a continuation of restrictions on uses.

The improvement in supply will be brought about by a suspension of the import duty on copper, probably for two years. This will release large tonnages now held in bonded warehouses and will stimulate future shipments. It will not overcome entirely the stiff foreign competition for copper offered on the world market, but this latter problem is being studied by our government.

The bill approved by the House Ways & Means Committee provides for suspension of the duty until Feb. 15, 1953, providing the price for copper in this country does not go below 24.00c a pound. Under the bill, if the price does go below 24.00c, the President would have to reimpose the duty within 35 days. The duty has been in effect since June 30, 1950.

In addition to the drop in imports, supplies have been reduced in recent months by the cut in production of refined copper from scrap. Refineries have been unable to pay the prices for scrap offered by brass ingot makers and operators in the conversion business. The situation is worsening steadily and the scrap market is now described as "chaotic." OPS is expected to issue an order containing specific red metal scrap prices since the general price freeze order has proved ineffective. Widespread violation of the General Ceiling Price Regulation is attributed to the fact that it gives an unjustified advantage to those buyers who paid fantastic high prices for scrap metal during the base period. Payment of the high prices now by other users is necessary to obtain operating supplies. They are paying in the East up to 29.00c for No. 1 copper, 26.00c for No. 2 scrap, 24.50c for light copper, and 25.00c for No. 1 composition. With a ceiling price of 24.50c for electrolytic copper, it is obvious refiners cannot compete for red metal scrap on the open market. Brass mills also are at a distinct disadvantage and many of them have assigned salesmen to search for new sources of supply.

Higher Zinc Cost Pends

Price of zinc delivered in New York will increase to about 18.2519c from the present level of 18.22c as a result of the 4 per cent increase in freight rates, effective Apr. 1. Sellers of high grade and special high grade zinc are expected to absorb the freight increase. This new cost factor is causing a delay in issuance of the expected government price order covering primary and secondary zinc.

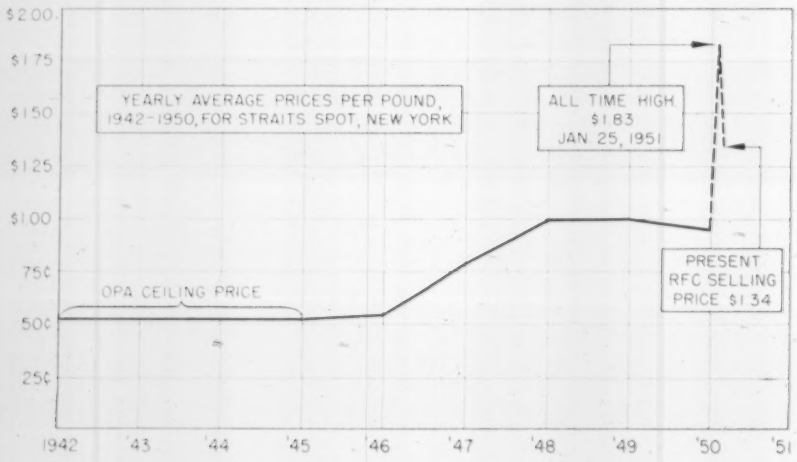
World Tin Market Unsettled

Tin prices in the domestic market are unchanged on the basis of $1.34 for prompt delivery of Straits to New York. This is the official RFC tin price. Whether this level will hold much longer is conjectural.

It is pointed out that the foreign market has consistently been 10 to 20 cents above RFC's price since that agency became the sole importer on Mar. 12. The government may purchase metal abroad at the higher levels and sell to domestic consumers at its fixed price, absorbing the difference.

Although tin prices have dropped sharply from the all-time high recorded earlier this year, the level is still far above the World War II price, as shown on the accompanying chart. Tin prices are 157.7 per cent above the 1942-1945 level. By comparison, the average price for all raw materials, as compiled by the Department of Commerce, has risen only 69 per cent during the same period.

Is Tin a Bargain at Government's Present Pegged Price?



April Lead Quotas Cut

Your difficulties in obtaining lead stems in large part from the drop in imports of the metal. The foreign market is quoted around 20.00c, f.a.s. Gulf ports compared with 16.80c, St. Louis. Foreign interests are still tapping the foreign production of lead at the expense of consumers in the United States.

An international committee is studying this situation, as well as similar ones in copper and zinc. It is attempting to formulate an agreement under which available supplies can be equitably distributed at reasonable prices. Some interests believe that the committee may be paving the way for the United States government to take over purchase for industry here as it has in tin.

Look for sharp cut backs in your lead quotas for April. Supplies are dwindling due to the growing shortage of scrap, as well as smaller imports. The shortage of lead for the full year is estimated at about 15 per cent below requirements. This will force NPA eventually to issue a conservation order, although none is expected in the immediate future.

Magnesium Plant To Reopen

Kaiser Aluminum & Chemical Corp., Oakland, Calif., leased the government-owned magnesium extrusion plant at Halethorpe, Md. and expects to have it in operation by the end of April. The plant was operated by Revere Copper & Brass Inc. in World War II and has been idle ever since. However, it is fully equipped and has an annual capacity of 30 million pounds of aluminum billets and 16 million pounds of extrusions. The plant also has magnesium castings and forging equipment. The plant was built in 1943 at a cost of $7,288,000 and contains 272,000 square feet. It will employ about 200 at the start.

Aluminum Product Supply Gains

Consumers are receiving larger shipments of aluminum and magnesium wrought products, but the increase is not keeping pace with demand. Shipments of aluminum wrought products amounted to 166 million pounds in January compared with 153 million pounds in December and 101 million pounds in January, 1950.

Shipments of magnesium wrought products aggregated 1,522,000 pounds in January compared with 1,318,000 pounds in December and 952,000 pounds in January, 1950. On an average working-day basis, shipments in January were 5 per cent above December, 1950, and 53 per cent over the January 1950, figure.

NONFERROUS METALS

(Cents per pound, carlots, except as otherwise noted)

Primary Metals

Copper: Electrolytic 24.50c, Conn. Valley; Lake 24.62½c, delivered.

Brass Ingots: 85-5-5-5 (No. 115) 29.00c; 80-10-10 (No. 215) 44.50c; 80-10-10 (No. 305) 35.00c; No. 1 yellow (No. 405) 25.50c.

Zinc: Prime western 17.50c; brass special 17.75c; intermediate 18.00c, East St. Louis; high grade 18.85c, delivered.

Lead: Common 16.80c; chemical 16.90c; corroding 16.90c, St. Louis.

Primary Aluminum: 99% plus, ingots 19.00c, pigs 18.00c. Base prices for 10,000 lb and over. Freight allowed on 500 lb or more but not in excess of rate applicable on 30,000 lb carlot orders.

Secondary Aluminum: Piston alloys 30.00-32.50c; No. 12 foundry alloy (No. 2 grade) 29.50-31.50c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 31.75-33.50c; grade 2, 30.00-31.50c; grade 3, 29.25-30.50c; grade 4, 27.50-30.00c. Prices include freight at c.l. rate up to 75 cents per 100 lb.

Magnesium: Commercially pure (99.8%) standard ingots, 10,000 lb and over 24.50c, f.o.b. Freeport, Tex.

Tin: Grade A, prompt 134.00.

Antimony: American 99-99.8% and over but not meeting specifications below 42.00c; 99.8% and over (arsenic 0.05% max.; other impurities 0.1% max.) 42.50; f.o.b. Laredo, Tex., for bulk shipments.

Nickel: Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 50.50c; 25-lb pigs, 53.50c; "XX" nickel shot, 54.15c; "F" nickel shot or ingots, for addition to cast iron, 51.00c. Prices include import duty.

Mercury: Open market, spot, large lots, New York, $216-$220 per 76-lb flask.

Beryllium-Copper: 3.75-4.25% Be, $1.56 per lb of alloy, f.o.b., Reading, Pa.

Cadmium: "Regular" straight or flat forms, $2.55 del.; special or patented shapes $2.80.

Cobalt: 97.99%, $2.10 per lb for 500 lb (kegs); $2.12 per lb for 100 lb (case); $2.17 per lb under 100 lb.

Gold: U. S. Treasury, $35 per ounce.

Silver: Open market, New York 90.16c per oz.

Platinum: $90-$93 per ounce from refineries.

Palladium: $24 per troy ounce.

Iridium: $200 per troy ounce.

Titanium (sponge form): $5 per pound.

Rolled, Drawn, Extruded Products

COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

Sheet: Copper 41.03; yellow brass 37.84; commercial bronze, 95%, 40.99; 90%, 40.55; red brass, 85%, 39.59; 80%, 39.15; best quality, 39.15; nickel silver, 18%, 51.91-52.36; phosphor-bronze grade A, 5%, 60.20-62.82.

Rod: Copper, hot-rolled 36.88; cold-drawn 38.13; yellow brass free cutting, 32.23; commercial bronze, 95%, 40.68; 90%, 40.24; red brass 85%, 39.28; 80%, 38.84.

Seamless Tubing: Copper 41.07; yellow brass 40.85; commercial bronze, 90%, 43.21; red brass, 85% 42.50.

Wire: Yellow brass 38.13; commercial bronze, 95%, 41.28; 90%, 40.84; red brass, 85%, 39.88; 80%, 39.44; best quality brass, 39.44.

Copper Wire: Bare, soft, f.o.b. eastern mills, c.l. 28.67-30.295; l.c.l. 29.17-30.92; 100,000 lb lots 28.545-30.295; weatherproof, f.o.b. eastern mills, c.l. 29.60, l.c.l. 30.10, 100,000 lb lots 29.35; magnet, del., 15,000 lb or more 34.50, l.c.l. 35.25.

ALUMINUM

(30,000 lb base; freight allowed on 500 lb or more, but not in excess of rate applicable on 30,000 lb c.l. orders.)

Sheets and Circles: 2S and 3S mill finish c.l.

Thickness Range, Inches	Widths or Diameters, In., Incl.	Flat Sheet Base*	Coiled Sheet Base	Coiled Sheet Circle† Base
0.249-0.136	12-48	30.1	...	...
0.135-0.096	12-48	30.6	...	...
0.095-0.077	12-48	31.2	29.1	33.2
0.076-0.061	12-48	31.8	29.5	33.4
0.060-0.048	12-48	32.1	29.5	33.7
0.047-0.038	12-48	32.5	29.8	34.0
0.037-0.030	12-48	32.9	30.2	34.6
0.029-0.024	12-48	33.4	30.5	35.0
0.023-0.019	12-36	34.0	31.1	35.7
0.018-0.017	12-36	34.7	31.7	36.6
0.016-0.015	12-36	35.5	32.4	37.6
0.014	12-24	36.5	33.3	38.9
0.013-0.012	12-24	37.4	34.0	39.7
0.011	12-24	38.4	35.0	41.2
0.010-0.0095	12-24	39.4	36.1	42.7
0.009-0.0085	12-24	40.6	37.2	44.4
0.008-0.0075	12-24	41.9	38.4	46.1
0.007	12-18	43.3	39.7	48.2
0.006	12-18	44.8	41.0	52.8

* Lengths 72 to 180 inches. † Maximum diameter, 26 inches.

Screw Machine Stock: 5000 lb and over.

Diam. (in.) or distance across flats	Round R317-T4,	Hexagonal R317-T4	Hexagonal 17S-T4
0.125	52.0	...	...
0.156-0.188	44.0	...	...
0.219-0.313	41.5	...	...
0.375	40.0	46.0	48.0
0.406	40.0	...	...
0.438	40.0	46.0	48.0
0.469	40.0	...	...
0.500	40.0	46.0	48.0
0.531	40.0	...	...
0.563	40.0	...	45.0
0.594	40.0	...	...
0.625	40.0	43.5	45.0
0.688	40.0	...	45.0
0.750-1.000	39.0	41.0	42.5
1.063	39.0	...	41.0
1.125-1.500	37.5	39.5	41.0
1.563	37.0	...	...
1.625	36.5	...	39.5
1.688-2.000	36.5	...	...

LEAD

(Prices to jobbers, f.o.b. Buffalo, Cleveland, Pittsburgh) Sheets: Full-rolls, 140 sq ft or more $22.00 per cwt; add 50c cwt 10 sq ft to 140 sq ft. Pipe: Full coils $22.00 per cwt. Traps and bends: List prices plus 60%.

ZINC

Sheets, 24.50c, f.o.b. mill 36,000 lb and over. Ribbon zinc in coils, 23.00c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 23.50-24.50c; over 12-in., 23.50-24.50c.

"A" NICKEL

(Base prices f.o.b. mill)

Sheets, cold-rolled, 71.50c. Strip, cold-rolled, 77.50c. Rods and shapes, 67.50c. Plates, 69.50c. Seamless tubes, 100.50c.

MONEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled 57.00c. Strip, cold-rolled 60.00c. Rods and shapes, 55.00c. Plates, 56.00c. Seamless tubes, 90.00c. Shot and blocks, 50.00c.

MAGNESIUM

Extruded Rounds, 12 in. long, 1.31 in. in diameter, less than 25 lb, 55.00-62.00c; 25 to 99 lb, 45.00-52.00c; 100 lb to 5000 lb, 41.00c.

TITANIUM

(Prices per lb, 10,000 lb and over, f.o.b. mill) Sheets, $15; sheared mill plate, $12; strip, $15; wire, $16; forgings, $6; hot-rolled and forged bars, $6.

Plating Materials

Chromic Acid: 99.9% flake, f.o.b. Philadelphia, carloads, 27.00c; 5 tons and over 27.50c; 1 to 5 tons, 28.00c; less than 1 ton 28.50c.

Copper Anodes: Base 2000 to 5000 lb; f.o.b. shipping point, freight allowed. Flat, untrimmed 37.69c; oval 37.19c. Cast 37.375c, delivered in eastern territory.

Copper Cyanide: 70-71% Cu, 100-lb drums, 1000 lb 60.8c, under 1000 lb 62.8c, f.o.b. Niagara Falls, N. Y.

Sodium Cyanide: 96-98% 3-oz ball, in 200 lb drums, 1 to 999 lb, 19.00c; 1000 to 19,999 lb, 18.00c, f.o.b. Niagara Falls, N. Y. Packaged in 100 lb drums add ½-cent.

Copper Carbonate: 54-56% metallic Cu; 50 lb bags, up to 200 lb, 29.25c; over 200 lb 28.25c, f.o.b. Cleveland.

Nickel Anodes: Rolled oval, carbonized, carloads, 68.50c; 10,000 to 30,000 lb, 69.50c; 3000 to 10,000 lb, 70.50c; 500 to 3000 lb 71.50c; 100 to 500 lb, 73.50c; under 100 lb, 76.50c; f.o.b. Cleveland.

Nickel Chloride: 100-lb kegs, 35.00c; 400-lb bbl, 33.00c up to 10,000 lb, 32.50c; over 10,000 lb, f.o.b. Cleveland, freight allowed on barrels, or 4 or more kegs.

Tin Anodes: Bar, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; ball, 1000 lb and over, nom.; 500 to 999 lb, nom.; 200 to 499 lb, nom.; less than 200 lb, nom.; f.o.b. Sewaren, N. J.

Sodium Stannate: 25 lb cans only, less than 100 lb, to consumers nom.; 100 or 300 lb drums only, 100 to 500 lb, nom.; 600 to 1900 lb, nom.; 2000 to 9900 lb, nom.; f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed.

Zinc Cyanide: 100 lb drums, less than 10 drums 47.7c, 10 or more durms, 45.7c, f.o.b. Niagara Falls, N.Y.

Stannous Sulphate: 100 lb kegs or 400 lb bbl, less than 2000 lb nom.; more than 2000 lb, nom., f.o.b. Carteret, N. J.

Stannous Chloride (Anhydrous): In 100 lb bbl, nom.; 100 lb kegs nom., f.o.b. Carteret, N. J.

Scrap Metals

BRASS MILL ALLOWANCES

Prices in cents per pound for less than 20,000 lb, f.o.b. shipping point.

	Clean Heavy	Rod Ends	Clean Turnings
Copper	23.00	23.00	22.25
Yellow Brass	20.125	19.875	18.75
Commercial Bronze 95%	21.875	21.625	21.125
90%	21.75	21.50	21.00
Red Brass 85%	21.50	21.25	20.75
80%	21.375	21.125	20.625
Muntz metal	19.00	18.75	18.25
Nickel, silver, 10%	22.25	22.00	11.125
Phos. bronze, A	24.00	23.75	22.75

BRASS INGOT MAKERS' BUYING PRICES

(Cents per pound, delivered eastern refineries, carload lots)

No. 1 copper 29.00; No. 2 copper 26.00; light copper 24.75; composition red brass 24.50-25.00; radiators 19.50; heavy yellow brass 19.50.

REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 21.50*; No. 2 copper 20.00*; light copper 19.00*; refinery brass (60% copper) per dry copper content 20.00.

* Nominal.

DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots)

Copper and brass: Heavy copper and wire, No. 1 25.50; No. 2 24.00, light copper 22.00; No. 1 composition red brass 21.50-22.00; No. 1 composition turnings 20.50-21.00; mixed brass turnings 13.00; new brass clippings 19.00-20.00; No. 1 brass rod turnings 18.00; light brass 15.00; clean heavy yellow brass 17.00; new brass rod ends 18.50; auto radiators 17.00-17.25; cocks and faucets, 18.00-18.50; brass pipe 19.00-19.50.

Lead: Heavy 15.75-16.00; battery plates 9.25-9.50; linotype and stereotype 17.00; electrotype 15.75-16.00; mixed babbitt 17.00.

Zinc: Old zinc 11.50-12.00; new die cast scrap 11.50-12.00; old die cast scrap 8.00-8.25.

Tin: No. 1 pewter 80.00-85.00; block tin pipe 125.00; No. 1 babbitt 75.00-80.00.

Aluminum: Clippings 2S 19.50; old sheets 16.00; crankcase 16.00; borings and turnings 12.00-12.50.

DAILY PRICE RECORD

1951	Copper	Lead	Zinc	Tin	Aluminum	Antimony	Nickel	Silver
Mar. 13-22	24.50	16.80	17.50	134.00	19.00	42.00	50.50	90.16
Mar. 12	24.50	16.80	17.50	*	19.00	42.00	50.50	90.16
Mar. 9-10	24.50	16.80	17.50	134.00	19.00	42.00	50.50	90.16
Mar. 8	24.50	16.80	17.50	139.00	19.00	42.00	50.50	90.16
Mar. 7	24.50	16.80	17.50	160.00	19.00	42.00	50.50	90.16
Mar. 6	24.50	16.80	17.50	174.50	19.00	42.00	50.50	90.16
Mar. 5	24.50	16.80	17.50	179.50	19.00	42.00	50.50	90.16
Mar. 2-3	24.50	16.80	17.50	181.75	19.00	42.00	50.50	90.16
Mar. 1	24.50	16.80	17.50	181.50	19.00	42.00	50.50	90.16
Feb. Avg.	24.50	16.80	17.50	182.716	19.00	42.00	50.50	90.16
Jan. Avg.	24.50	16.80	17.50	171.798	19.00	35.462	50.50	88.890

* Nominal.

NOTE: Copper, Electrolytic, del. Conn. Valley; Lead, common grade, del. St. Louis; Zinc, prime western, E. St. Louis; Tin, Straits, del. New York; Aluminum primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

CEILING PRICES, IRON AND STEEL SCRAP

Prices as set forth in Office of Price Stabilization ceiling price regulation No. 5, effective Feb. 7, 1951.

STEELMAKING SCRAP COMPOSITE

Mar. 22	$44.00
Mar. 15	44.00
Feb. 1951	44.00
Mar. 1950	28.23
Mar. 1946	19.17

Based on No. 1 heavy melting grade at Pittsburgh, Chicago and eastern Pennsylvania.

Basing point ceiling prices per gross ton from which maximum shipping prices are computed on scrap of dealer and industrial origin, and from which ceiling on-line and ceiling delivered prices are computed on scrap of railroad origin.

No. 1 Heavy Melting Steel (Grade 1)

Basing Point	Dealer, Industrial	Railroad
Alabama City, Ala.	$39.00	$41.00
Ashland, Ky.	42.00	44.00
Atlanta, Ga.	39.00	41.00
Bethlehem, Pa.	42.00	44.00
Birmingham, Ala.	39.00	41.00
Brackenridge, Pa.	44.00	46.00
Buffalo, N. Y.	43.00	45.00
Butler, Pa.	44.00	46.00
Canton, O.	44.00	46.00
Chicago, Ill.	42.50	44.50
Cincinnati, O.	43.00	45.00
Claymont, Del.	42.50	44.50
Cleveland, O.	43.00	45.00
Coatesville, Pa.	42.50	44.50
Conshohocken, Pa.	42.50	44.50
Detroit, Mich.	40.00	42.00
Duluth, Minn.	40.00	42.00
Harrisburg, Pa.	42.50	44.50
Houston, Tex.	37.00	39.00
Johnstown, Pa.	44.00	46.00
Kansas City, Mo.	39.50	41.50
Kokomo, Ind.	42.00	44.00
Los Angeles	35.00	37.00
Middletown, O.	43.00	45.00
Midland, Pa.	44.00	46.00
Minnequa, Colo.	38.00	40.00
Monessen, Pa.	44.00	46.00
Phoenixville, Pa.	42.50	44.50
Pittsburg, Calif.	35.00	37.00
Pittsburgh, Pa.	44.00	46.00
Portland, Oreg.	35.00	37.00
Portsmouth, O.	42.00	44.00
St. Louis, Mo.	41.00	43.00
San Francisco	35.00	37.00
Seattle, Wash.	35.00	37.00
Sharon, Pa.	44.00	46.00
Sparrows Point, Md.	42.00	44.00
Steubenville, O.	44.00	46.00
Warren, O.	44.00	46.00
Weirton, W. Va.	44.00	46.00
Youngstown, O.	44.00	46.00

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 heavy melting steel) for other grades of dealer and industrial scrap.

Open-hearth and Blast Furnace Grades

2. No. 2 Heavy Melting	—$2.00
3. No. 1 Busheling	Base
4. No. 1 Bundles	Base
5. No. 2 Bundles	—3.00
6. Machine Shop Turnings	—10.00
7. Mixed Borings & Short Turnings	— 6.00
8. Shoveling Turnings	— 6.00
9. No. 2 Busheling	— 4.00
10. Cast Iron Borings	— 6.00

Electric Furnace and Foundry Grades

11. Billet, Bloom & Forge Crops	+ 7.50
12. Bar Crops & Plate Scrap	+ 5.00
13. Cast Steel	+ 5.00
14. Punchings & Plate Scrap	+ 2.50
15. Electric Furnace Bundles or Cut Structurals & Plate:	+ 2.00
16. 3 feet and under	+ 3.00
17. 2 feet and under	+ 5.00
18. 1 foot and under	+ 6.00
19. Briquetted Cast Iron Borings	Base
20. Foundry Steel, 2 feet and under	+ 2.00
21. Foundry Steel, 1 foot and under	+ 4.00
22. Springs and Crankshafts	+ 1.00
23. Alloy Free Turnings	— 3.00
24. Heavy Turnings	— 1.00

Special Grades

25. Briquetted Turnings	Base
26. No. 1 Chemical Borings	— 3.00
27. No. 2 Chemical Borings	— 4.00
28. Wrought Iron	+10.00
29. Shafting	+10.00

Restrictions on Use

(1) Prices for Grades 11, 23 and 24 may be charged only when shipped to a consumer directly from an industrial producer of such grades; otherwise ceiling prices shall not exceed prices established for the corresponding grades of basic open-hearth and blast furnace scrap.

(2) Prices established for Grades 26 and 27 may be charged only when such grades are sold for use for chemical or annealing purposes; otherwise ceiling prices for such grades shall not exceed the price established for Grade 10.

(3) Prices established for Grade 28 may be charged only when sold to a producer of wrought iron; otherwise ceiling price for such grade shall not exceed the ceiling price established for the corresponding grade of basic open-hearth.

Special Pricing Provisions

(1) Sellers of Grades 26 and 27 may make an extra charge of $1.50 per ton for loading in box cars, or 75 cents per ton for covering gondola cars with a weather-resistant covering.

(2) Ceiling price of pit scrap, ladle scrap, salamander scrap, skulls, skimmings or scrap recovered from slag dumps and prepared to charging box size, shall be computed by deducting from the price of No. 1 heavy melting steel of dealer and industrial origin, the following amounts: Where iron content is 85% and over, $4; 75% and over, $6; less than 75%, $10.

(3) Ceiling price of any inferior grade of scrap not listed shall not exceed the price of No. 1 heavy melting steel less $15.

Differentials from Base

Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap.

2. No. 2 Heavy Melting Steel	—$2.00
3. No. 2 Steel Wheels	Base
4. Hollow Bored Axles	Base
5. No. 1 Busheling	— 3.50
6. No. 1 Turnings	— 3.00
7. No. 2 Turnings, Drillings & Borings	—12.00
8. No. 2 Cast Steel	— 6.00
9. Uncut Frogs, switches	Base
10. Flues, Tubes & Pipes	— 8.00
11. Structural, Wrought Iron and/or steel, uncut	— 6.00
12. Destroyed Steel Cars	— 8.00
13. No. 1 Sheet Scrap	— 6.50
14. Scrap Rails, Random Lengths	+ 2.00
15. Rerolling Rails	+ 7.00
Cut Rails:	
16. 3 feet and under	+ 5.00
17. 2 feet and under	+ 6.00
18. 18 inches and under	+ 8.00
19. Cast Steel, No. 1	+ 3.00
20. Uncut Tires	+ 2.00
21. Cut Tires	+ 5.00
22. Uncut Bolsters & Side Frames	Base
23. Cut Bolsters & Side Frames	+ 3.00
24. Angle & Splice Bars	+ 5.00
25. Solid Steel Axles	+12.00
26. Steel Wheels, No. 3 oversize	Base
27. Steel Wheels, No. 3	+ 5.00
28. Spring Steel	+ 5.00
29. Couplers & Knuckles	+ 5.00
30. Wrought Iron	+ 8.00

Restrictions on Use

(1) Price established for Grade 15 may be charged only when purchased and sold for rerolling uses; otherwise, ceiling price for such grade shall not exceed ceiling price established for Grade 14.

(2) Price established for Grade 30 may be charged only when sold to a producer of wrought iron; otherwise, ceiling price for such grade shall not exceed ceiling price established for No. 1 heavy melting steel.

CAST IRON SCRAP

Ceiling price per gross ton for any of the following grades of cast iron scrap shall be the price shown in the following table, f.o.b. shipping point.

1. Cast Iron, No. 1 (Cupola Cast)	$49.00
2. Cast Iron, No. 2 (Charging Box Cast)	47.00
3. Cast Iron, No. 3 (Heavy Breakable Cast)	45.00
4. Cast Iron, No. 4 (Burnt Cast)	41.00
5. Cast Iron Brake Shoes	41.00
6. Stove Plate	46.00
7. Clean Auto Cast	52.00
8. Unstripped Motor Blocks	43.00
9. Wheels, No. 1	47.00
10. Malleable	55.00
11. Drop Broken Machinery Cast	52.00

Restrictions on Use

(1) Ceiling shipping point or on-line price which a basic open-hearth consumer may pay for No. 1 cast iron, No. 1 wheels, clean auto cast or malleable shall be the ceiling price established for No. 3 cast iron.

(2) Ceiling shipping point or on-line price which any foundry consumer other than a malleable iron producer may pay for Grade 10 shall be the ceiling price established for No. 1 cast iron.

Preparation Charges

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of dealer or industrial origin which is allocated by the National Production Authority to a consumer, shall be as follows:

(1) For preparing into Grades No. 1, No. 2 or No. 3, $8.
(2) For hydraulically compressing Grade No. 4, $6 per ton; Grade No. 5, $8.
(3) For crushing Grade No. 6, $3.
(4) For preparing into Grade No. 25, $6.
(5) For preparing into Grade No. 19, $6.
(6) For preparing into Grade No. 12, Grade No. 13, Grade No. 14, or Grade No. 18, $10.
(7) For preparing into Grade No. 17 or Grade No. 21, $10.
(8) For preparing into Grade No. 16 or Grade No. 20, $10.
(9) For hydraulically compressing Grade No. 15, $8.
(10) For preparing into Grade No. 28, $10.

Ceiling fees per gross ton which may be charged for intransit preparation of any grade of steel scrap of railroad origin shall be as follows:

(1) For preparing into Grade No. 1 and Grade No. 2, $8.
(2) For hydraulically compressing Grade No. 13, $6.
(3) For preparing into Grade No. 16, $4.
(4) For preparing into Grade No. 17, $5.
(5) For preparing into Grade No. 18, $7.
(6) For preparing into Grade No. 21, $4.
(7) For preparing into Grade No. 23, $4.

Ceiling fees per gross ton which may be charged for intransit preparation of cast iron shall be limited to the following:

(1) For preparing Grade No. 8 into grade No. 7, $9.
(2) For preparing Grade No. 3 into Grade No. 1, $4.

Whenever scrap has arrived at its point of delivery and the consumer engages a dealer to prepare such scrap, no fee may be charged for such services unless the consumer obtains prior written approval from OPS.

No preparation charge other than the charges set forth above may be made for the preparation of any grade of iron or steel scrap unless the consumer has secured prior written approval of such charges from OPS.

Commissions

No commissions shall be payable except by a consumer to a broker for brokerage services rendered. Where scrap is allocated by NPA other than from a government agency the seller may designate a broker. Where scrap is allocated by NPA from a governmental agency the consumer may designate a broker. In the event a broker purchases scrap for sale to a consumer, such consumer may pay such broker a commission not exceeding $1 a ton.

Unprepared Scrap

The term "unprepared scrap" shall not include such demolition projects as bridges, box cars or automobiles which must be so priced that the prepared scrap will be delivered to the consumer within the established ceiling delivered prices.

For unprepared steel scrap other than materials suitable for hydraulic compression, the ceiling basing point prices shall be $8 per gross ton beneath the established ceiling price of the prepared base grades No. 1 heavy melting or No. 1 railroad heavy melting steel.

For unprepared material which when compressed constitutes No. 1 bundles the ceiling basing point price shall be $6 per gross ton beneath the ceiling basing point price for No. 1 bundles; or when compressed constitutes No. 2 bundles the ceiling basing point price shall be $8 per ton beneath the ceiling basing point price for No. 2 bundles.

Any iron casting which cannot be broken with an ordinary drop into Grade No. 2 or Grade No. 1 may not be classified as Grade No. 3. Where such iron casting requiring blasting or other special preparation is sold to a consumer of scrap, the shipping point price for Grade No. 3 must be reduced by the amount of the additional charges required for preparation.

Premiums for Alloy Content

No premium may be charged for alloy content except: $1.25 per ton for each 0.25% of nickel where scrap contains not less than 1% and not over 5.25% nickel; $2 per ton for scrap containing not less than 0.15 per cent molybdenum and $3 for scrap containing not less than 0.65% molybdenum; for scrap containing not less than 10% manganese, $4 for scrap in sizes larger than 12 x 24 x 8 in., and $14 for scrap cut in that size or smaller (applicable only if scrap is sold for electric furnace uses or on NPA allocation); $1 for scrap conforming to SAE 52100 when sold for electric furnace use only.

Switching Charges

Switching charges to be deducted from basing point prices of dealer, industrial and nonoperating railroad scrap, to determine ceiling shipping point prices for scrap originating in basing points are per gross ton:

Alabama City, Ala., 43c; Ashland, Ky., 47c; Atlanta, 51c.
Bethlehem, Pa., 52c; Birmingham, 50c; Brackenridge, Pa., 53c; Buffalo, 83c; Butler, Pa., 65c.
Canton, O., 51c; Chicago (including Gary, Ind.), $1.34; Cincinnati (including Newport, Ky.), 65c; Claymont, Del. (including Chester, Pa.), 79c; Cleveland, 76c.
Coatesville, Pa., 50c; Conshohocken, Pa., 20c.
Detroit, 95c; Duluth, Minn., 50c.
Harrisburg, Pa., 51c; Houston, Tex., 57c.
Johnstown, Pa., 75c.
Kansas City, Mo., 78c; Kokomo, Ind., 51c.
Los Angeles (including Firestone switching district), 66c.
Middletown, O., 26c; Midland, Pa., 75c; Minnequa, Colo., 33c; Monessen, Pa., 51c.
Phoenixville, Pa., 51c; Pittsburg, Calif., 65c; Pittsburgh (including Bessemer, Homestead, Duquesne, Munhall), 99c; Portland, Oreg., 52c; Portsmouth, O., 51c.
St. Louis (including Granite City, E. St. Louis, Madison, Ill.), 51c; San Francisco (including So. San Francisco, Niles, Oakland), 66c; Seattle, 59c; Sharon, Pa., 75c; Sparrows Point, Md., 20c; Steubenville, O., 51c.
Warren, Pa., 75c; Weirton, W. Va., 70c.
Youngstown, 75c.

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LEADERS IN IRON AND STEEL SCRAP SINCE 1889

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Sheets, Strip . . .

Sheet and Strip Prices, Page 139 & 140

Chicago—Prior to upping of minimum DO percentages by NPA first opening one sheetmaker had for hot-rolled sheets was May 1952. This has now been moved forward to December this year. On other flat rolled products of DO rating June is the first month for enameling sheets, July for electrical sheets and galvanized sheets, October for cold rolled sheets, and November for hot rolled strip. Another mill which says its bookings on hot rolled sheets amount to 61 per cent of output has openings in June, July and August depending upon width. Cold rolled sheets are booked to 35 per cent with openings in July, galvanized at 30 per cent with openings in September. Strip stands at 12 per cent.

Pittsburgh — Market here is extremely tight with little hope of early relief. Jones & Laughlin Steel Corp.'s Pittsburgh Works is still closed by a rail labor dispute and as a result an estimated 2000 tons of sheets are being lost from production daily. However, the affected sheet mills are opating part time on stocks and on conversion tonnage. Hot bands on conversion account are being shipped in by truck, which tonnage along with mill stocks permits a few turns a week on the cold-reducing mills. Since rated orders take precedence in scheduling there likely will be little civilian steel tonnage available from these mills for a time after full operations are resumed. Increase in the hot-rolled sheet set-aside to 25 per cent from 17 has resulted in few schedule upsets. Most producers were overbooked on DO tonnage and the increased set-aside allows them to push rated tonnage forward, at the expense of civilian sheet supply, of course.

Cleveland—Cutbacks in sheet supplies to consumer durable goods manufacturers will hit hard in May with more tonnage scheduled for diversion to military and supporting accounts. Pressure for hot-rolled tonnage on DO orders has been rising steadily over recent weeks and this accounts for the upping of the mill set-aside tonnage on this category to 25 per cent. It had been 17 only a couple weeks. Further complicating the producers' distributing problem is the latest amendment to NPA order M-6 which in a sense amounts to a directive on the mills to provide the warehouses with 85 per cent of their tonnage receipts of carbon steel products in the base peroid, first 9 months of 1950.

Cincinnati—Sheet mills in this district find that May schedules will necessitate a sharp cut back in tonnage for nonrated customers. Supplies likely will be tightest in hot-rolled. DO ordering is extended, even though deliveries were brought nearer by the change in set-aside tonnage from 17 to 25 per cent. Output of sheets has not been dislocated by conversion to plates.

New York—Sheet sellers have little or nothing to offer in the way of DO-rated work before third quarter, despite the recent increase in the percentage the mills are called upon to set aside for such work. Promises on electrical sheets are still well extended, running into August and September in some cases; and on narrow hot strip, in the case of one leading producer, fourth quarter.

Philadelphia—Most sheet mills are into July and beyond on DO-rated business, depending much upon the grade. Those which are not too far extended in their promises explain it as being due in part to the fact that they are carrying a heavier load than percentage quotas call for.

Los Angeles—DO 97 orders are beginning to trickle through. Fabricators of MRO equipment, seeing the program as an open road to more steel, actively urge their customers to use DO 97 liberally. Warehouses report only a few DO 97's so far, the mills virtually none.

San Francisco—With mills heavily booked, the hope for any easing in availability of strip has gone aglimmering. A large eastern producer will not reopen his books here on strip until July or August.

Tubular Goods . . .

Tubular Goods Prices, Page 142

San Francisco—Delivery by eastern mills on new orders for steel tubing (3½ inches and smaller) runs up to about August. Contractors need great quantities for installations long before that time. The latter group is canvassing every possible source for supplemental supplies.

Seattle—Cast iron pipe agencies are figuring numerous small jobs. Withdrawal of water service from Gulf ports to the Pacific Northwest imposes an additional handicap upon local houses, there being a $10 spread between water and rail freights from Birmingham. Utah producers have a freight advantage. Sellers of competing types of pipe are quoting faster deliveries than those on cast iron.

Plates . . .

Plate Prices, Page 139

Pittsbugh—Platemakers anticipate an increase in requirements for the railroad car program for June. This program, it will be recalled, was cut back to 9000 units for May from 10,000 However, it is understood the program will be upped to 10,000 units, possibly more, for June (STEEL, Mar. 12, p. 156). Impact of the shipbuilding and ship repair programs will be felt chiefly by the continuous mills. A substantial part of the plate tonnage required by these programs is expected to come from these mills. Sheetmakers under the latest regulation of NPA must set-aside for plates on DO account 5 per cent of their average monthly shipments of hot-rolled sheets in the first eight months of 1950, the base period.

Boston—Bulk of light plates produced on sheet-strip mills will go to meet rated requirements. Increasing volume of rolled armor plate is ahead for plate mills while heavier DO orders and MRO placements are steadily cutting into tonnage for commercial allocation. This trend, apparent in May schedules, will continue into June. Meanwhile, plate shops, somewhat late, are more seriously looking for defense work. If they are able to obtain steel to support shop operations this appears imperative.

New York—Plate sellers have closed their books for May, despite some confusion recently when it became known that DO order numbers would be applied to allocated programs. In every case so far as can be learned the mills set aside for production the requirements originally set up for these programs. They regard the DO numbers as something merely identifying these directives. Under the proposed 4 per cent increase in freight rates to become effective Apr. 4, the rate from Sparrows Point to New York will be 44 cents, two cents higher than the present base rate.

Philadelphia—While some plate tonnage is still available against DO-rated orders for June, most mills can accept nothing before July and one large producer nothing before August on sheared plate.

Chicago—Upward of 50 per cent of plate capacity is earmarked for DO orders. This figure includes direct defense and support programs which now are classified as DO. July is the first month in which additional rated capacity can be booked and June for floor plates.

Seattle—City has opened bids for a water supply line, involving 5000 tons of plates. Tenders for reinforced concrete pipe were $30,000 lower than steel plate. Award is pending. Oil companies here and at Portland, Oreg., are planning additional facilities involving unstated plate tonnages. Plates are increasingly short and small plants are under a heavy handicap. Their immediate hope is for DO orders.

Steel Bars . . .

Bar Prices, Page 139

New York—Most sellers of hot carbon bars have little to offer on DO-rated tonnage before third quarter, notwithstanding the recent increase in percentage of mill set-asides. This also applies particularly to cold drawn carbon bars and to alloy bars. Some sellers are booked well into the third quarter on these latter grades. Application of DO-rated order numbers to allocation programs did not affect the schedule of shipments set up in May against these directives. Proposed interim freight rates, scheduled to become effective Apr. 4, will result in a 2-cent increase in the rates here from Johnstown, Pa., Buffalo and Pittsburgh. The rate from Johnstown will be 56 cents; Buffalo 60 cents; and Pittsburgh 64 cents.

Boston—Hot-rolled bar inventories with cold finishing mills rise and fall week by week. At the moment some have replenished for temporary high operations to meet overdue shipments. Increasing number of orders for rated requirements cut down civilian allocations, notably in alloys. Maintenance-repair-operation order has stimulated buying while forge shops in most cases are pressing for additional tonnage.

Pittsburgh—Hot-rolled bar producers notice a slight increase in demand pressure with the fastener industry now included in the freight car program. Locomotive program needs, however, have had little impact on the market as yet though it is expected substantial tonnage will be needed over the next several months. The new NPA ruling re-

quiring producers to accept orders from warehouses up to 85 per cent of the latter's tonnage in the base period (first 9 months of 1950) will result in a reduction of tonnage for non-rated mill customers. Cold-finished bars remain scarce in this area; tank-automotive and munitions are taking most of DO tonnage in this category. Some increases are reported in demand for the railroad car program. Alloy shortage continues a serious problem for producers of alloy bars.

Cleveland—Extent to which warehouse order volume will cut into bar mill tonnage after DO requirements are cared for is uncertain. Under NPA amended order M-6, which came out Mar. 16, the steelmakers must provide the distributors with 85 per cent of the latter's receipts of carbon steel products in the base period, first 9 months of last year. This amended regulation is seen as a directive on the mills giving the warehouses preference in shipments after DO requirements are met. But with DO tonnage increasing it is uncertain whether the warehouse take in bars will be much, if any, greater than it has been in recent months.

Chicago—A barmaker here states that 58 per cent of its output is tagged for DO, this including direct defense and support program ratings. First months with openings for additional rated tonnage are June for alloy bars and rail steel bars and July-August rolling cycle for hot-rolled and reinforcing bars.

Structural Shapes . . .

Structural Shape Prices, Page 139

Pittsburgh—Demand for structurals has not slackened despite the ban on certain types of building. Fabricators are heavily booked ahead and are anticipating a steady increase in volume of industrial and heavy construction work of a defense nature. The huge steel expansion program alone will take a large tonnage out of the market. There is some uncertainty as to just how this tonnage will be allocated. As a general thing structural fabricators are booking new business cautiously, especially if it is of a general nature. They are trying to keep their commitments within the bounds of their prospective steel supply.

Boston—For aircraft plant expansion, 7645 tons have been placed for four projects, Connecticut, by United Aircraft Corp. Of the total Harris Structural Steel Co., New York, booked 7200 tons. With 6600 tons placed for a power plant by a Boston engineering firm, awards are heavier. Bulk carry priority ratings on which delivery is several months ahead of unrated contracts. Schools and hospitals account for smaller awards. Bridge needs being estimated approximate 12,000 tons.

New York—Industrial activity features structural work in this district, several fair sized jobs either being placed or up for bidding. School work also has taken a spurt. New interim freight rate from Bethlehem to New York, effective Apr. 4, will be 30 cents, compared with existing base rate of 29 cents.

Philadelphia—Fabricators declare DO ratings on industrial work are becoming more numerous. They look for a sharp increase over the next several months. This, if it develops, will cause an appreciable reshuffling of schedules for non-rated projects, especially those that are not already being processed. Most of the large and medium sized shops are booked up a year or more ahead.

San Francisco—A large warehouse reports its second quarter quota on structurals has been reduced about 30 per cent from the first three months.

Seattle—Major structural tonnages are involved in Alaska projects. Fabricators have fair backlogs. Inquiry for small lots for industrial and miscellaneous construction is tapering. Supplies are still acute, particularly for wide flange sizes. Deliveries from eastern producers are behind schedule.

Reinforcing Bars . . .

Reinforcing Bar Prices, Page 139

Boston—Demand for concrete reinforcing bars is well in excess of supply with distributors reluctant to quote on tonnage projects which include several thousand tons for veterans hospital buildings, Brockton, Mass. Housing projects still account for substantial lots with 1000 tons, Worcester, going to Bethlehem Steel Co. Bridges, about to be closed, take 2200 tons.

Los Angeles—Fabricators look for reinforcing bar demand to be the greatest experienced in months. More large projects are coming off the shelf and others are already out for bid. The Pershing Square underground garage will take 2300 tons of fabricated bars. Construction of $1 million of barracks at Camp Pendleton will start in June.

Seattle—Rolling mills have better than average backlogs of bar orders, but inquiry has slowed because of building restrictions and confusion over interpretation of directives. Tying wire for reinforcing bar jobs is extremely scarce and may force some large operations to close. This item is not produced in this area and it is almost impossible to obtain it from eastern plants.

Semifinished Steel . . .

Semifinished Prices, Page 139

Pittsburgh—Shortage of semifinished steel has been felt in this district for months past, but even more acute conditions threaten as result of the shutdown of the Pittsburgh Works of Jones & Laughlin Steel Corp. by a railroad labor dispute. Since the strike started the middle of this month the company has lost about 60,000 tons of ingots and 45,000 tons of finished steel. These losses will never be made up since the works had been operating at virtual capacity prior to the labor trouble.

Cleveland—Steelworks operations in this district last week hit a 103 per cent of capacity pace. This compares with 100.5 the preceding week. Producers are pushing production to the limit of available facilities but pressure from the finishing mills for semifinished tonnage is stronger than ever. Local works of Jones & Laughlin Steel Corp. has been bringing in pig iron from the Pittsburgh district since one of its blast furnaces here was taken off for repairs. Closing down of J. & L.'s Pittsburgh works because of railroad labor trouble has not resulted in any loss of pig iron tonnage moving to the Cleveland plant.

Wire . . .

Wire Prices, Page 141

Chicago—A wiremaker in this district is not booking civilian business for third quarter because of the constantly increasing DO load. Deliveries are extended through second quarter. Overall DO orders aggregate about 10 per cent but the picture is changing rapidly. Within one week's time direct defense volume for wire rods jumped from 5 to 10 per cent.

Boston—More wire orders under MRO supplement are mounting rated volume. Tonnage available for open distribution is smaller in May schedules and tightening is enhanced by limited rod supply to meet heavy demand. Aircraft component procurement has stepped up, straining increased set-aside for alloys, with antifriction bearing and screw requirements heavier. Little overall tonnage will be gained by the 20 per cent restrictions on use of steel in some products. This will be offset by DO and MRO orders. Latter are piling in with some doubt as to interpretation for acceptance for some end uses.

Los Angeles—Gray market operators, having swept the market clean of wire mesh, turn around and offer it at prices higher than fabricators can get for it. Refusing to yield, fabricators substitute small-diameter reinforcing bar which is in good supply.

Tin Plate . . .

Tin Plate Prices, Page 140

Chicago—June is the first month that a local tin plate producer has openings for new DO business in hot dipped and black plate under the minimum set-aside schedule. For electrolytic tin plate, July is the first open month. Gary sheet and tin mill of United States Steel Co. reports continued shortage of box cars for making shipments although some improvement has occurred.

Tool Steel . . .

Tool Steel Prices, Page 141

San Francisco—Delivery on new orders for tool steels produced out of this state extend about 20 weeks, due to such mill setbacks as the recent railroad switchmen's strike.

Builders Hardware Sales Dip

San Francisco—Outlook for the builders hardware industry in 1951 is clouded with uncertainty, Charles Kendrick, president of Schlage Lock Co. advised stockholders in the company's annual statement. He said shortages of raw materials already are here and "are bound to grow worse as requirements of the armed forces and defense industries expand." Mr. Kendrick added that "it is more than probable sales of builders hardware will be greatly curtailed by government restrictions on all classes

of construction." The Schlage firm has been substituting low carbon steel for critical materials in lock making.

Alloy Steel . . .

San Francisco—Stocks of stainless steel at some supply points are holding up better than other items. But not because of lack of demand; simply a matter of limiting uses to those of the most highly essential nature.

Manganese Ore . . .

Washington—Shipments from domestic mines of manganese ore averaging (natural) 35 per cent or more manganese increased 10 per cent in 1950 to 139,000 net tons. This was the largest total for any year since 1946, reports the Bureau of Mines, this city. Imports of ore in 1950 established a new all-time high at 1,837,950 net tons, including 101,630 tons of battery grade material. India was again the leading source with 34 per cent of the total, followed by Union of South Africa with 26 per cent. In addition to receipts of ore, 110,842 tons of imported ferromanganese increased total supply of manganese above the 2 million ton mark for the first time in history.

Pig Iron . . .

Pig Iron Prices, Page 138

Cleveland—Merchant pig iron demand exceeds sellers' ability to promptly satisfy. The foundries, however, are getting sufficient metal to support their operations on a high level. Most foundries in the area are on a 5-day per week basis, a few of them on 6 days. A little foreign iron has come into this territory over recent months but the tonnage has not been large. Increasing scarcity of cast scrap, however, is causing some shops to show more interest in foreign metal. Currently, 8 out of the 9 blast furnaces in this immediate district are in operation. One Jones & Laughlin stack has been down for repairs since early in the month but expectations are it will be blown back in around Apr. 1. J. & L. has been shipping pig iron into the local plant from the Pittsburgh district since this stack was blown out.

Buffalo—Civilian production continues to grab the major portion of merchant pig iron output as melters rush to get in as much production as possible before the scheduled expansion in government work. Some improvement is noted in the railroad car situation as producers report iron is now moving out promptly with no necessity for piling stock. With scrap supply shrinking, one major ingot producer reports an increase in the ratio of iron used in steel production. All 16 of the area's stacks continue on the active list.

Boston—Inventories include some foreign iron bought late last year, but bulk of this tonnage has been delivered and used. New purchases are limited. Offerings are smaller and since the 1950 bulge in buying, foreign iron has advanced $15 to $17 ton ex-dock. One steelworks is operating on New York state basic and another is high on scrap. Basic supply is more uncertain than foundry grades. Mystic furnace, operating at capacity, is forced to hold consumers to contract levels. Most foundries would, if possible, take in more iron within inventory limitation.

New York—Stringency in pig iron continues, although district foundries generally are able to operate on a five-day-a-week basis by using more than a normal amount of scrap and ferroalloys. Effective Apr. 4, a 4 per cent increase in interim freight rates will bring the Brooklyn delivered price on No. 2 foundry from Bethlehem up to $58.96, against the current rate of $58.79, and on malleable to $59.46 against $59.29. Delivered Newark, N. J., prices from Bethlehem will be $56.74, against $56.63, on basic; $57.24, against $57.13, on No. 2 foundry; $57.74, against $57.63, on malleable; and $58.24, against $58.12, on bessemer.

Philadelphia—District foundries are having increasing difficulty sustaining operations due to the stringency in pig iron. Inventories in various cases are low and if it weren't for their stepping up of scrap and ferroalloy consumption they would not be able to maintain output.

Pittsburgh—Merchant iron producers are turning away inquiries in this area. Supply situation is tighter, but no foundries are reducing operations because of lack of iron. Charcoal iron sellers are booked solidly for the balance of the year. Salesmen are expediting shipments from producing plants.

Additional merchant blast furnace capacity is planned for this area. Pittsburgh Coke & Chemical Co. will erect a stack on Neville Island for which certificate of necessity has been granted. Capacity is expected to be 22,000 tons per month. It will be at least a year before the furnace is ready for operation.

Cincinnati—Expanding needs of the machine tool industry for castings, reflected in more extensive farming out of casting jobs, is putting added strain on pig iron supply. Furnaces are holding shipments at established levels without offering much hope for more tonnage, thus shifting greater reliance on foreign iron and scrap.

Chicago—Foundries in this district continue to operate on a hand-to-mouth basis on pig iron as well as scrap and coke. Deliveries are reasonably good although delays in receipt of freight cars pose shipping problems for iron suppliers. Of the district's 42 blast furnaces 41 are operating. Indiana Harbor "A" furnace of Inland Steel Co., scheduled to go down Mar. 10, operated an additional 5 days before being idled. This unit will come back in after the ore shipping season opens.

St. Louis—Pig iron supplies still meet local minimum needs but consumers are shopping diligently for foreign iron against expected greater scarcities. Result is foreign iron is becoming less and less available. Foreign metal delivers here at $76-$80, as compared to the $55 local price. Sale of the Granite City Koppers' blast furnaces to Granite City Steel Co. is beginning to reduce allotments to distant customers. No cut has been made, and none is reported in prospect, for local consumers.

Seattle—Foundry operations continue above normal seasonal levels. Some DO contracts have been placed locally. Iron shipments from Africa are arriving here, but European pig is practically out of the local market as it is being used at source.

Chrome Ore . . .

Washington—Consumption of chromite in the United States during 1950 reached an all-time high of 980,369 tons, reports the Bureau of Mines. Of 277,124 tons used in the fourth quarter, 138,160 tons were consumed for metallurgical purposes, mainly in the manufacture of ferrochromium; 88,243 tons were consumed in the manufacture of 113,468 tons of chromium refractories; 9597 tons were used in miscellaneous purposes, mainly in repairing basic furnace linings; 41,124 tons were consumed in the manufacture of 26,601 tons of chromium chemicals.

Industrial consumers reported having 606,271 tons of chromite on hand Dec. 31, 1950, compared with 756,995 tons at the end of 1949. Of total stocks on hand at the yearend, 248,872 tons were of metallurgical grade, 251,663 tons of refractory, and 105,736 tons of chemical grade.

Ferroalloys . . .

Ferroalloy Prices, Page 143

Washington—Shipments of silicon alloys in the United States during the fourth quarter of last year increased 4 per cent over the third quarter, making the total for the year 814,425 tons against 610,378 tons in 1949.

Apparent consumption of silicon alloys in the fourth quarter increased 5 per cent over the third quarter and totaled 230,296 tons, making the 1950 total 827,185 tons compared with 615,555 tons in 1949.

Imports of ferrosilicon increased over those in the third quarter and totaled 6261 net tons, valued at $372,611. This compared with 4216 tons, valued at $267,987 during the previous quarter. Imports in the fourth quarter contained 1871 tons of silicon, or an average of 30 per cent.

Iron Ore . . .

Iron Ore Prices, Page 143

Cleveland—The 1951 lake shipping season is getting under way slowly. First trainloads of ore are arriving from the mines at loading docks though Escanaba, Mich., dockworkers struck last week and tied things up at that point. However, indications are vessel loading will get going well before Apr. 1.

Stocks of iron ore at lower lake docks and furnaces are down somewhat from a year ago. As of Mar. 1 stocks totaled 24,123,294 tons, according to the Lake Superior Iron Ore Association. This compares with 26,715,393 tons on the same date a year ago.

During February consumption of ore by the 177-American and 10 Canadian blast furnaces dependent chiefly on Lake Superior ore totaled 6,434,581 tons. This compares with 5,334,667 in the like month of 1950.

Chicago—United States Steel Co.

INSIDE STORY..

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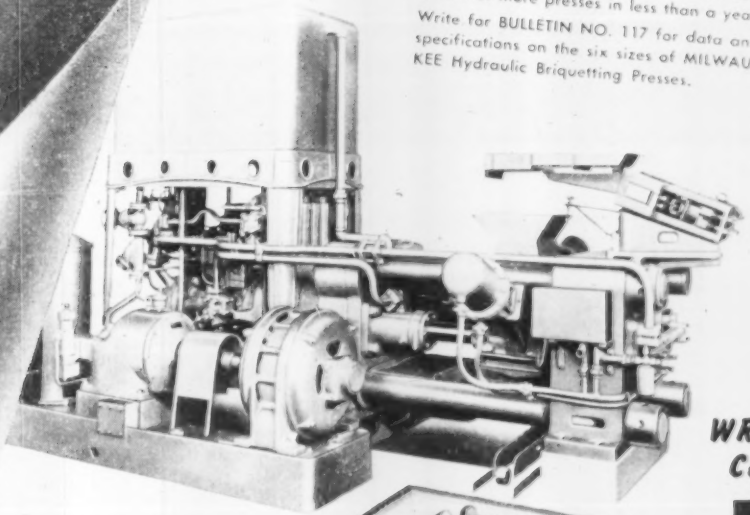

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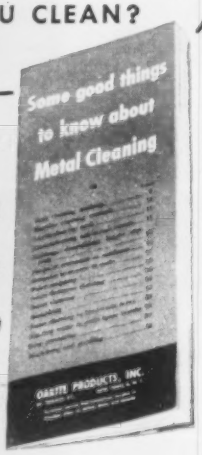

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ended its history making program of all-rail shipment of iron ore from Minnesota docks to Pittsburgh, Youngstown and Chicago on Mar. 15 as scheduled but the tonnage of about 1 million tons was only half of that contemplated.

Although the company utilized ore cars used on the ranges to handle the movement, the program fell short of the goal because of the unusually severe winter which interfered with operations at both ends and also because of tieups suffered as result of the railroad switchmen's strike.

Original program called for 1 million tons to Pittsburgh, 500,000 to Youngstown and 500,000 to the Chicago district. The eastern centers are understood to have received somewhat more of the ore brought down than these quotas indicate.

Metallurgical Coke . . .

Metallurgical Coke Prices, Page 142

Pittsburgh—Price increase on both oven and beehive furnace and foundry coke looms immediately ahead. Government price stabilization authorities have authorized increases in line with raw material costs. However, it probably will be a couple weeks before producers take action since they are not completely clear as to the provisions of the government regulations.

Demand for oven foundry coke is in excess of production capacity. Sellers are spreading available supply as equitably as possible, however. As a result, no serious curtailment of foundry activities is reported in this area. More shops would lengthen their work weeks, however, were they assured adequate supplies of pig iron and coke.

Trade opinion here is that the only relief in the present tight coke supply situation rests in greater use of Connellsville beehive coke. This is reflected in a noticeable spurt in inquiry since the first of the month, in part due to closing down of the Erie, Pa., ovens for repairs.

For the long term, the outlook for improved supplies of metallurgical coke rests on expansion of oven capacity. A number of projects are on the boards, most of them in connection with steelworks expansions. These mean little so far as the merchant market is concerned. However, this past week it became known that the one large merchant iron producer in this immediate district, Pittsburgh Coke & Chemical Co., in addition to having obtained a certificate of necessity to install additional pig iron capacity, has an application pending for a necessity certificate to build a battery of 35 ovens.

Cleveland—Expectations are oven coke prices will be adjusted upward in line with government stabilization authority permission to mark up prices to the extent of raw material cost increases. However, sellers here have taken no action and indications are nothing will be done until the government order is thoroughly digested. The OPS ruling permits producers of all grades of coke, coke oven gas and coke chemicals to add increased costs of raw materials to their ceiling prices when the cost increases occurred between Jan. 25 and June 30, 1951. The action came in supplementary regulation 13 to the general ceiling price order. It is intended to reflect the increased price of bituminous coal attending the miners' wage hike.

OPS May Peg Tungsten Prices

Washington — A dollars-and-cents ceiling price regulation for the ferro-tungsten industry may be issued by the Office of Price Stabilization. Members of the industry's advisory committee have informed the agency that the general ceiling price regulation is not working out satisfactorily, and has resulted in widely varying ore costs. The committee stresses the necessity of establishing prices which would encourage expansion of domestic tungsten ore production.

Members of the committee are: Robert Archer, Climax Molybdenum Co., New York; L. G. Bliss, Foote Mineral Co., Philadelphia; Marx Hirsch, Molybdenum Corp. of America, New York; P. W. Davis, General Electric Co., Nela Park, Cleveland; J. H. Spillane, Electro Metallurgical Division, Union Carbide & Carbon Corp., New York; P. S. Lasdon, Reduction & Refining Co., Kenilworth, N. J.; Martin Coleman, Pacific Metallurgical Products Co., Azusa, Calif.; T. P. Moran, Wah Chang Metallurgical Co., New York.

Rails, Cars . . .

Track Material Prices, Page 141

Pittsburgh—Some uncertainty prevails in steel circles as to the volume of steel that will be allocated for railroad cars in June. Cutback of the car program to 9000 units for May appears to have caused some adverse comment in railroad circles. However, the car steel alloted for that month is only 20,000 to 30,000 tons less than the previous monthly allocation of approximately 310,000 tons. Further, the saved tonnage is understood to have been diverted to car component manufacturers, such as fastener makers. Curently, talk in the trade has it the car program will be restored to 10,000 units monthly beginning in June. Naturally, this will call for an increase in the direct steel allocation for cars. Also, it is said, steel will be provided for component manufacturers. All of which is cause for speculation among steel men as to just how much additional overall tonnage they will be called upon to provide for the car program.

San Francisco—An Association of American Railroads' official, speaking before a conference of the Pacific Coast Transportation Advisory Board, said the number of freight cars on order has reached a record of 155,000. R. E. Clark, manager, closed car section, Car Service Division of the AAR, estimated it would take until the end of 1952 to clean up the backlog. He said February orders, alone, totaled 15,979 cars and deliveries were 5400. Mr. Clark said the big bottleneck in the freight car building program is steel, even though the National Production Authority has a directed program with the nation's mills to furnish steel needed for building as many as 10,000 cars a month.

The board estimated the Pacific

least would need 467,896 cars to handle the area's shipments in the three months ended June 30. This would be 0.2 per cent under actual loadings in the second quarter of last year. However, an analysis of the car requirements indicated the slight decline would be more a reflection of not being able to depend on availability of the cars rather than actual needs.

Scrap . . .

Scrap Prices, Page 146

Pittsburgh—Scrap is moving out of dealers' yards in this district almost as quickly as it is moved in and prepared. Collections, however, are improving, the moderate weather being a contributing factor in this regard. Fear of a severe shortage later in the year prevails. So far, however, the mills have been able to maintain operations at, or close to, capacity, to some extent at expense of their inventories. Pleas of the scrap trade for relief from certain onerous provisions of the government scrap price code still have not been acted upon. However, the scrap men are hopeful of early action.

Philadelphia — Scrap is getting about as scarce as pig iron. While apparently there is not the upgrading in this district that prevails in some others, the overall situation throughout the country is regarded as serious with Washington taking an increasingly sober view. Indications are that government inspectors will be appointed to make spot checks of cars in classification yards and that possibly early revisions will be made in prices on certain grades of steel and cast scrap, one price for heavy melting, one for bundles and so on, as was the case under OPA in World War II. Some trade leaders believe that such revision must be made if upgrading is to be checked.

Boston—Buyers of cast are combatting upgrading more actively, notably those with inventories large enough to resist. This accounts in part for some slackening in those grades. No. 1 heavy melting steel scrap is in limited supply with inventories low. Less industrial scrap is appearing in the open market, but is going back to original supplying mills. Yards are paying $23 for heavy steel scrap. Volume being taken in at yards is only fair. Allocation of steel scrap may be near in some cases.

Buffalo—Dealers have renewed orders for steelmaking grades of scrap but tonnages are limited due to the light supplies on hand. The situation becomes more alarming as big mill consumers report stockpiles still being called upon to maintain production. The search for cast scrap is intensified with a tightening in the merchant pig iron trade. More interest is placed on the opening of the navigaton season to help the supply situation. Mills report heavy tonnages are expected both by lake vessels and by barge via the canal from the East.

Chicago — Consumers are indicating growing concern over the consequences of NPA's continuing allocation of scrap from this district to Ohio points and the Granite City area. Mills report inventories of steelmaking grades as low to moderate, and the allocations, involving principally dealer material, hasten the time when supply will be dangerously short in this district. As it is scrap is being brought in from points as far away as Texas. Allocations to Chicago mills at some later date will involve cross hauling and increased freight costs and would operate as a penalty against foresightedness. There is no question but that the free market is suffering from disruption. Foundries also have a tough row to hoe. Cast material is very short and is being shipped in from remote points.

Detroit—Local OPS office advises there has been no change in the price regulation governing the Detroit scrap price and says no moves are contemplated at Washington. Meanwhile, however, the split market continues to be prevalent and the trade is more up-in-the-air than ever over how to sell its scrap. Trading, therefore, is dull, although demand is extremely high for all types of scrap.

Cleveland — Several foundries in this district are applying to Washington for relief in their scrap supply problem. They point out that receipts have shown no improvement from the low level which has persisted since effective date of the scrap price order and that the volume is tending still lower. As a result, inventories are being depleted rapidly and may force curtailment in operations soon. Some tonnages of upgraded scrap are being offered these foundries which are refusing them; these tonnages finding a market elsewhere, it is claimed. Inactivity of the market here is attributed largely to the heavy volume of material that is moving to mills on direct allocation.

Cincinnati — Iron and steel scrap brokers are reaching out farther for tonnage to meet district demands, with melters willing to meet higher freight charges. Dealers were showing more activity in collections until unseasonable weather hampered work. Supplies of cast and electric furnace scrap are running low, with some operations dependent on prompt deliveries. Little railroad scrap is available except on allocation.

Los Angeles—Scrap inventories are down to one-two months supply from the usual four-six months. Big problem in this district is the slow-down of scrap production as plants tool-up. Collections, currently up a bit and improving, are 20-25 per cent smaller than at this time last year.

San Francisco—Volume of incoming steel scrap is being fairly well maintained. While there has been some dipping into inventories, it has not been nearly so deep as during periods in the immediate past. Yards are processing scrap as rapidly as possible. All concerned stress the necessity for industrial plants and other generators to keep scrap coming to market. No major difficulty has been experienced with the price formula, although minor complaints are heard.

Seattle—Cast iron scrap is available in tonnages sufficient for current foundry operations, but the industry feels that government regulations have raised prices unnecessarily.

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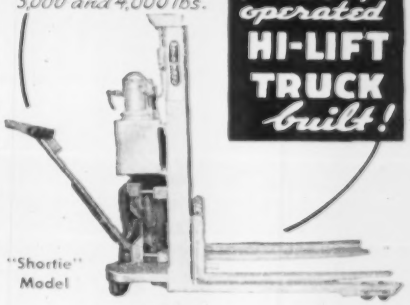

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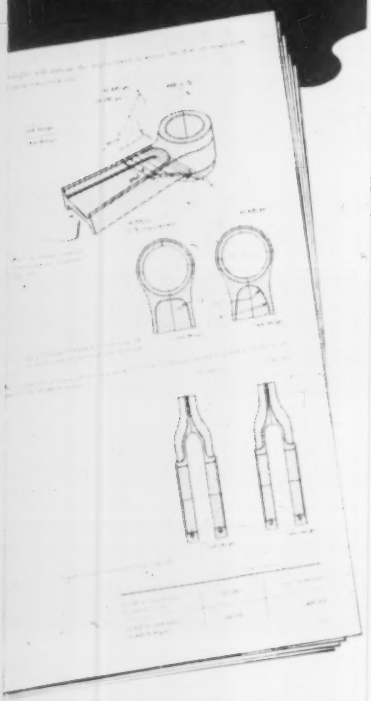

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every possible source to augment supplies, but with scant success. Mills have no inventories and are operating on day-to-day receipts. Bethlehem, Seattle, will receive a 10,000-ton cargo from the Philippines by the end of the month. This plant is consuming 20,000 tons a month.

Dealers complain that, while labor costs in this area are the highest in the country, local scrap prices are $9 under Pittsburgh. They also advocate scrapping obsolete ships in the layup fleets, but the Federal Maritime Board's policy is to hold such tonnage in reserve. Dealers contend it would be cheaper and more profitable in the long run to construct new vessels. They argue that scrapping of one damaged hull a month would greatly relieve the shortage of scrap in the area.

Material Shortages Cut Output

San Francisco—The relatively smaller electronics manufacturing shops are hard pressed for materials to keep their plants operating at a pace necessary to meet demands made on them. A check with a sales organization of a leading producer outside of California of electrical materials used in the manufacture and assembly work in transformers, electric motors, telephonic and radar equipment and electronic products, indicates that no bookings are being accepted for third quarter.

Warehouse . . .

Warehouse Prices, Page 143

Philadelphia—Latest amendment to warehouse regulation M-6 has met with mixed reaction among distributors. The amendment declares that mills must provide the warehouses with 85 per cent of average monthly tonnage of carbon products supplied during the first 9 months of last year and that this is to include DO-rated orders. Under the original regulation the warehouses have been permitted to receive up to 100 per cent of the monthly average provided rated tonnage and directive programs did not interfere. Moreover, distributors could add DO-rated tonnage to such quotas.

Under the original program most warehouses have fared fairly well. From some mills they have received practically 100 per cent of their tonnage, although they could have sold much more if they had had it. Their DO-rated business, however, lagged until just recently when MRO ratings greatly boosted volume of preference business. But even on this count all has not been too well. They could pass their ratings on to the mills, but they have found that they could not make ready replacements because of extended mill promises on rated tonnage.

Time will tell whether distributors hold an advantage under the new amendment. Some think they will not make out so well; others are not sure. Distributors emphasize that the new percentage figure is a floor, not a ceiling, although they admit that many mills will be disposed, in effect, to regard it as a ceiling.

The warehouses would have preferred not to have DO-rated tonnage included in the 85 per cent allotment but take some solace in the fact that replacements cannot be readily made, as they have been discovering recently. One leading seller says that the way things look to him at the moment, he will get less tonnage of bars and shapes, but will receive more plates and come out about even on sheets. He admits, however, that experience could vary among the different warehouses.

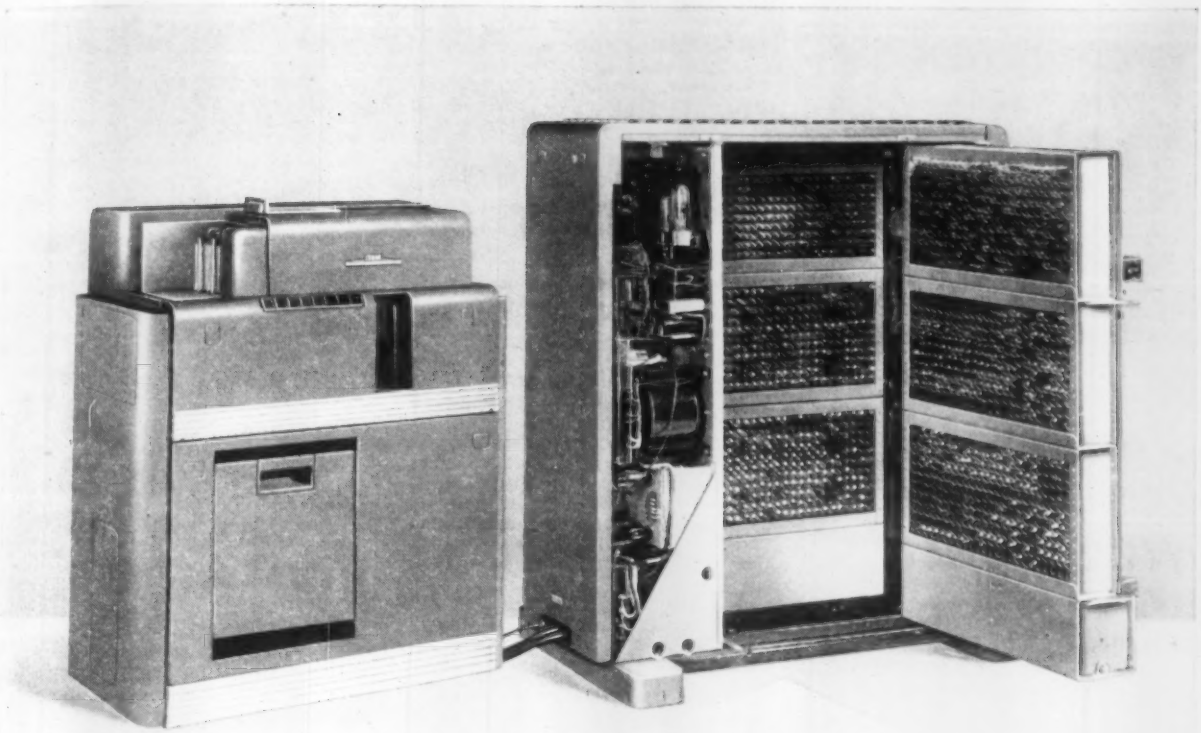
Pittsburgh—Warehouse operators here are encouraged by reports in the trade that the National Production Authority will issue a regulation requiring the steel mills to provide the distributors with 85 per cent of the latter's tonnage receipts in the base period, first 9 months of 1950. Their requirements, however, will continue to be taken care of after DO needs are fully met, it is understood. Should the regulation work out as intended it would result in substantial increase in warehouse receipts. Some distributors report their intake in recent months has amounted to only 40 to 50 per cent of their receipts in the base period. Meanwhile, demand on the warehouses continues in excess of their ability to meet promptly, with stocks low and unbalanced in all categories.

Cleveland—Warehouse distributors anticipate some improvement in their inventory position over coming months as result of National Production Authority's latest action amending its order M-6. The amended order provides that the mills furnish distributors 85 per cent of the latter's receipts of carbon steel products in the base peroid, first 9 months of last year. The warehouses have been receiving only about 60 per cent of their base tonnage receipts, it is said. Outlook with respect to alloy products supplies is unpromising. Distributors' alloys receipts have been running around 10 per cent of their base period tonnage and there is little prospect for any change for the better in the near future.

Cincinnati—With mill shipments tending lighter, the warehouse supply situation is gradually getting worse. Distributors are unable to estimate accurately the gap between demand and available steel because of extensive shopping, inquiries from regular mill customers, and practice of many to specify greater than immediate needs on assumption it will be trimmed. DO-rated orders are increasing.

Chicago—Warehouses and mills are struggling to determine correct interpretations and implications of last week's revision of NPA materials order M-6. Several points need to be cleared up before either industry can operate under the new provisions. First month in which benefit can be derived is June since the 45-day lead time for May has expired. From June on warehouses would expect to receive fixed tonnages each month, as against tonnages which have been declining progressively month by month. Warehouses continue to be faced with more demand than they can accommodate with shrinking inventories. Only a small percentage has been of DO classification although during the past two weeks a surge has occurred from DO-97 MRO—and more is expected.

Los Angeles—Inquiries are zoom-



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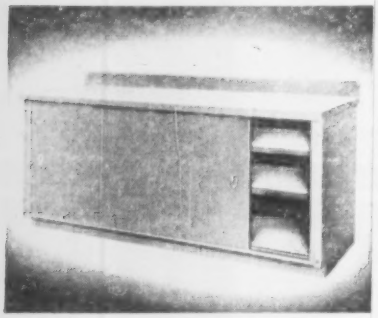

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ing as aircraft manufacturing plants start expanding tooling-up programs. Structural shapes, plates, and cold-rolled sheet are in strong demand. Aircraft subcontractors have swept the market clean of chrome-moly 4130 bars.

San Francisco—General situation in warehouse steel is still without improvement. Additional dents are being put into inventories by acceptance of DO-97 business. These MRO ratings are being extended to the mills, which generally promise August replenishments. Second quarter quotas, generally, will be under those in the first three months. This, in turn, means further headaches for many small metalworking shops which depend on warehouses for steel to meet their own schedules.

Seattle—Demand for warehouse steel continues strong, but distributors are confused by priority directives which are variously interpreted. Plates and sheets are scarcer than ever; tubing is critical; wide flange plates are very difficult to obtain. Bar size angles are in fair supply from coast mills. Eastern shippers are in arrears on deliveries. Inventories are well under normal levels.

Canada . . .

Toronto, Ont.—Production of steel ingots and castings in Canada was at an all time monthly high in January, with a total of 309,653 net tons, 91.6 per cent of rated capacity. This compares with 291,242 tons or 86.2 per cent in the previous month and with 289,949 tons or 84.5 per cent in January, 1951.

Production of pig iron in January amounted to 197,025 net tons, 84.5 per cent of capacity, against 198,169 tons or 85 per cent in the preceding month and with 190,432 tons or 81.6 per cent for January, 1950.

Output of ferroalloys in January amounted to 23,079 net tons, and included ferrosilicon, silicomanganese, ferromanganese, ferrochrome, chrome-X and ferrophosphorus. For December output amounted to 15,341 tons and in January, 1950, 9961 tons.

Texas Talk From Los Angeles

The Los Angeles Chamber of Commerce wants federal agencies to locate regional offices in their city, and have cited Los Angeles' defense role as proof. The chamber pointed out that L. A. in World War II ranked first nationally in shipbuilding contracts, totalling nearly $2 billion and also led in major aircraft contracts with total value over $7 billion.

Most of current defense contracts awarded on the West Coast have been placed in southern California, the Chamber states. Los Angeles also claims 46 per cent of all Pacific Coast manufacturing plants.

STRUCTURAL SHAPES . . .

STRUCTURAL STEEL PLACED

3100 tons, power house, General Electric Co., Cincinnati, to Whitehead & Kales Co., Detroit.

1450 tons, plant No. 10, Philco Corp., Philadelphia, to Bethlehem Steel Co., Bethlehem, Pa.

1300 tons, 12-story addition, Jefferson Hospital, Philadelphia, to Bethlehem Steel Co.

1020 tons, pharmaceutical building, Armour & Co., Bradley, Ill., to Ingalls Iron Works Co., Birmingham.

450 tons, addition, Manhattan College, New York, to Bethlehem Steel Co.

415 tons, state bridge, Ocean county, New Jersey, to Bethlehem Steel Co.

325 tons, new building, Maytag Co., Newton, Iowa, to St. Paul Foundry & Mfg. Co., St. Paul.

300 tons, housing project, Worcester, Mass., to George Dean Co., Worcester; B. Perini & Sons Inc., Framingham, Mass., general contractor.

230 tons, factory, Fairchild Corp., Wayland, N. Y., to Pittsburgh Bridge & Iron Works, Pittsburgh.

200 tons, buildings, veterans' hospital, Brockton, Mass.

150 tons, buildings, Brown Co., Berlin, N. H., to Bancroft & Martin Rolling Mills Co., Portland, Me.; Morton C. Tuttle Co., Boston, general contractor.

150 tons, school, upstate New York, to Utica Structural Steel Co., Utica, N. Y.

100 tons, Washington state bridge, Lewis county, to Pacific Car & Foundry Co., Seattle.

STRUCTURAL STEEL PENDING

825 tons, state bridge, Chenango county, New York, between Bainbridge and Masonville; bids Mar. 21.

627 tons, state bridge, Indiana and Westmoreland counties, Pennsylvania; bids Apr. 29.

624 tons, three warehouses, Warren, O., for U. S. General Services Administration; bids Mar. 27.

624 tons, three warehouses, Hammond, Ind., for U. S. General Services Administration; bids Apr. 2.

439 tons, bridge, section 42SF-9, Cook county, Illinois; bids of Jan. 19 rejected, new bids Mar. 30.

416 tons, two warehouses, Dayton, O., for U. S. General Services Administration; bids Mar. 21.

333 tons, state bridge, Lehigh county, Pennsylvania; bids Apr. 29.

300 tons, bridge FN-64, Jasper county, Iowa; bids Mar. 20.

300 tons, bridge, section 146F, St. Clair county, Illinois; bids of Jan. 19 rejected, new bids Mar. 30.

236 tons, bridge F06-1(26), Waukesha county, Wisconsin; L. G. Arnold, Eau Claire, Wis., low on bids of Mar. 15.

145 tons, bridge, S-995-1, Mitchell county, Iowa; bids Mar. 20.

Unstated tonnage, Public School No. 112, Queens, New York; bids Apr. 3.

Unstated tonnage, high school, Port Washington, N. Y.; bids Mar. 26.

Unstated tonnage, freight and office building, Central Railroad of New Jersey, Elizabeth, N. J.; bids asked.

REINFORCING BARS . . .

REINFORCING BARS PLACED

1000 tons, housing project, Worcester, Mass., to Bethlehem Steel Co.; B. Perini & Sons Inc., Framingham, Mass., general contractor.

600 tons, Twin Towers Apartments, Chicago, to Joseph T. Ryerson & Son Inc., Chicago; Sumner S. Sollitt Construction Co., Chicago, contractor.

355 tons, main drain, project UI-261(39), Congress Street superhighway, Chicago, to United States Steel Supply Co., Chicago; John C. Tully Co., Chicago, contractor.

250 tons, addition to Tacoma library, to English Steel Co., Tacoma, Wash.

125 tons, Goodyear Tire & Rubber Co., Akron, O., to United States Steel Supply Co., Chicago.

100 tons, York Township high school, Elm-

...rst, Ill., to Cego Steel Products Corp., ...go, Ill.; Axel E. Johnson, Chicago, con...ctor.

...ated state viaduct and overpowning ... contracts) Lane county, Oregon, to ...ociated interests; Hamilton & Thomas, ...gene, Oreg., general awards.

REINFORCING BARS PENDING

... tons, grain elevator, Joseph Schlitz ...ewing Co., Milwaukee.

... tons, Mayo Memorial Hospital, Minne...polis; new bids Mar. 21 among three low ...idders.

... tons, steel joists, three warehouses, Ham...ond, Ind., for U. S. General Services ...dministration; bids Apr. 2.

... tons, steel joists, three warehouses, War...en, O., for U. S. General Services Admin...stration; bids Mar. 27.

... tons, Tyrone power station, Lexington, ...ky.

... tons, steel joists, two warehouses, Dayton, ..., for U. S. General Services Administration; bids Mar. 21.

... tons, bridge substructure and access roads, Merrimac river, Amesbury-Newburyport, Mass.; bids Apr. 10, department of public works, Boston.

... tons, new parts depot, Ford Motor Co., Melrose Park, Ill.; Austin Co., Chicago, general contractor.

... tons, National Distillers Products Corp., Louisville.

... tons, second stage, Albeni Falls, Idaho; Donovan-James Construction Co., Seattle, low $3,839,148.

... tons, South Charleston bridge, Kanawha County, West Virginia.

... tons, 5-story territorial building, Juneau, Alaska; general award to Carson Construction Co., Helena, Mont., low base $1,333,379.

... tons, expansion, Nordberg Co., Milwaukee.

... tons, St. Joseph's Hospital, Mitchell, S. Dak.; bids Mar. 20.

... tons, Hale elementary school, Chicago; Harvey A. Hanson, Chicago, low on general contract.

... tons, addition, Mt. Loretto Convent, Dubuque, Iowa; Conlon Construction Co., Dubuque, contractor.

Unstated, $2.5 million high school, Aurora, Ill.; bids Apr. 16.

Unstated, addition to Albert Merritt Billings Hospital, Chicago; bids Apr. 2.

Unstated, five utility buildings for naval radio station; bids to 13th Naval district, Seattle, March 30.

Unstated, military installations, St. Lawrence Island, Alaska; general contract to Morrison-Knudsen Co. and Peter Kiewit Sons Co., low $5,053,970 by U. S. Engineer.

PLATES . . .

PLATES PLACED

1900 tons, H-piling, third stage Seattle waterfront viaduct, to Bethlehem Pacific Coast Steel Corp., Seattle.

100 tons or more, asphalt and storage tanks, Willbridge station, Shell Oil Co., Portland, to Chicago Bridge & Iron Co., Seattle, and Gunderson Bros. Engineering Co., Portland.

Unstated, also shapes, 23 steel cargo barges for U. S. Navy, to Gunderson Bros. Engineering Co., Portland, Oreg., at $1.7 million.

PLATES PENDING

5000 tons, 8-mile 72 and 60-inch Bow Lake water supply line, Seattle; United Concrete Pipe Corp., Baldwin Park, Cal., low $1,769,311; for reinforced concrete pipe same firm low $1,145,991.

2200 tons, three 125-barrel storage tanks, Hastings, Minn., for U. S. Corps of Engineers, Omaha, Nebr.; bids Mar. 13.

Unstated, elevated water tank and steel tower, J. P. Alvey substation, Oregon; bids to Bonneville Power Administration, Portland, Oreg., Mar. 30.

Unstated, 13 oil storage tanks, 3/8 in., 10 gage roofs; bids to Federal Supply Service, Seattle, March 22.

Unstated tonnage, 500,000-gallon storage tank, Military Academy, West Point, N. Y.; bids Apr. 3, alternate on concrete construction.

PIPE . . .

STEEL PIPE PLACED

5333 tons, steel water main, Queens, New York, to Walsh-Holyoke Boiler Works Inc., Holyoke, Mass.

CAST IRON PIPE PENDING

250 tons, 12-inch, water line, Fort Peck district; bids Apr. 11, Corps of Engineers, Fort Peck, Mont.

RAILS, CARS . . .

LOCOMOTIVES PLACED

Kansas City Southern, four 2250-horsepower diesel-electric passenger units to the Electro-Motive Div., General Motors Corp., La Grange, Ill.

New York Central, 387 diesel-electric locomotive units; Electro-Motive Division, General Motors Corp., La Grange, Ill., awarded 138 road freight units, 44 switchers and 22 road-passenger units; American Locomotive Co., New York, 94 road-freight units and 40 switchers; Fairbanks, Morse & Co., Chicago, 8 road-passenger units and 12 road-freight units; and Baldwin-Lima-Hamilton Corp., Eddystone, Pa., 18 road-freight and 11 switcher units. This is the largest order for motive power ever placed by this railroad.

Texas & Pacific, 31 diesel-electric locomotives; placed.

RAILROAD CARS PLACED

Atlantic Coast Line, six 50-ton air dump cars, to Magor Car Corp., New York.

Canadian National, 100 thirty-ton flat cars and 1000 forty-ton automobile cars, to Canadian Car & Foundry Co., Montreal, Que.

Central of New Jersey, 500 fifty-ton box cars, to American Car & Foundry Co., New York.

Kansas City Southern, 500 seventy-ton hopper cars, to Pullman-Standard Car Mfg. Co., Chicago.

Mather Stock Car Co., 500 forty-ton refrigerator cars, to its own shops.

Pennsylvania, 250 seventy-ton covered hopper cars, to its own shops in Altoona, Pa.

Texas & Pacific, 250 gondolas, to its own shops at Marshall, Tex.

Virginian, 300 fifty-ton box cars, to the Pullman-Standard Car Mfg. Co., Chicago.

FERROALLOYS

(Continued from page 143)

4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

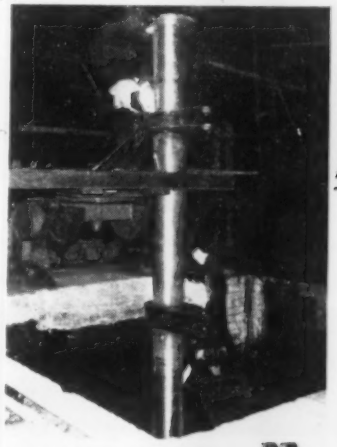
Low-Carbon Ferrochrome: (Cr 67-72%.) Contract, carload, lump, bulk, max. 0.03% C 33.60c per lb of contained Cr, 0.04% C 31.50c, 0.06% C 30.50c, 0.10% C 30.00c, 0.15% C 29.75c, 0.20% C 29.50c, 0.50% C 29.25c, 1% C 29.00c, 1.50% C 28.85c, 2% C 28.75c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.3c. Delivered. Spot, add 0.25c.

Low-Carbon Ferrochrome, Nitrogen Bearing: Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N.; add 5c for each 0.25% of N above 0.75%.

Foundry Ferrochrome, High Carbon: (Cr 62-66%, C 5-7%). Contract, c.l. S M x D, bulk, 23.25c per lb of contained Cr, c.l. packed 24.15c, ton 25.50c, less ton 27.25c. Delivered Spot, add 0.25c.

Foundry Ferrochrome, Low Carbon: (Cr 50-54%, Si 28-32%, C 1.25% max.) Contract, carload, packed, S MxD, 16.35c per lb of alloy; ton lot 17.2c; less ton lot, 18.4c, delivered; spot, add 0.25c.

Low-Carbon Ferrochrome Silicon: (Cr 34-41%, Si 42-49%, C 0.05% max.) Contract, carload, lump, 4" x down and 2" x down, bulk, 21.75c per lb of contained chromium plus 12.4c per pound of contained silicon; 1" x down, bulk 21.90c per pound of contained chromium plus

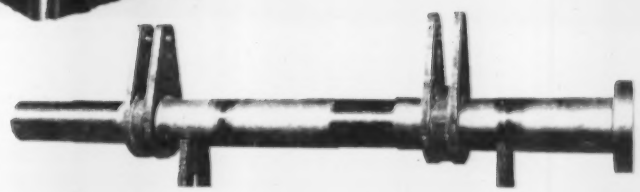


TITUSVILLE

. . . an outstanding source for precision quality

FORGINGS

for over fifty years



Associated welding facilities make production of Forgings combined with Weldments, such as the Equalizer Shaft illustrated, an everyday occurrence.

Struthers Wells

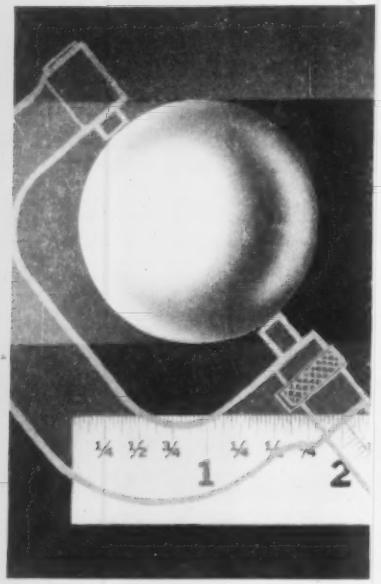
STRUTHERS WELLS CORPORATION

TITUSVILLE FORGE DIVISION

TITUSVILLE, PENNA.

ONLY A BALL

has { one dimension / one surface



but oh—how important

Important not only in precision ball bearings, but also in the lot of other applications where Strom metal balls have been doing the job better. Strom has been in on a great many ball-application problems, and knows how important these two factors are for the best results.

Strom has been making precision metal balls for over 25 years for all industry and can be a big help to you in selecting the right ball for any of your requirements. In size and spherical accuracy, perfection of surface, uniformity, and dependable physical quality, there's not a better ball made.

Strom
STEEL BALL CO.
1850 South 54th Avenue
Cicero 50, Illinois

Largest Independent and Exclusive Metal Ball Manufacturer

12.60c per pound of contained silicon. F.o.b. plant; freight allowed to destination.

Ferrochrome Silicon, No. 2: (Cr 36-39%, Si 36-39%, Al 7-9%, C 0.05% max.) 21.75c per lb of contained silicon plus 12.4c per lb of contained silicon plus aluminum, 3" x down, delivered.

Chromium Metal: (Min. 97% Cr and 1% Fe) Contract carload, 1" x D; packed, max 0.50% C grade, $1.08 per lb of contained chromium ton lot $1.10, less ton $1.12. Delivered. Spot add 5c.

Tungsten Alloys

Ferrotungsten: (70-80%). Contract, 10,000 lb W or more, $3.25 per lb of contained W 2000 lb W to 10,000 lb W, $3.25; less than 2000 lb W, $3.47. Spot, add 2c.

Tungsten Powder: (W 98.8% min.) Contract or spot, 1000 lb or more, $4.15 per lb of contained W; less than 1000 lb W, $4.25.

Silicon Alloys

25-30% Ferrosilicon: Contract, carload, lump, bulk, 20.00c per lb of contained Si; packed 21.40c; ton lot 22.50c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

50% Ferrosilicon: Contract, carload, lump, bulk, 12.40c per lb of contained Si, carload packed 14.0c, ton lot 15.45c, less ton 17.1c. Delivered. Spot, add 0.45c.

Low-Aluminum 50% Ferrosilicon: (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

75% Ferrosilicon: Contract, carload, lump, bulk, 14.3c per lb of contained Si, carload packed 15.6c, ton lot 16.75c, less ton 18.0c. Delivered. Spot, add 0.8c.

80-90% Ferrosilicon: Contract, carload, lump, bulk 15.55c per lb of contained Si, carload packed 16.8c, ton lot 17.8c, less ton 18.95c. Delivered. Spot, add 0.25c.

Low-Aluminum 85% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 85% ferrosilicon prices.

90-95% Ferrosilicon: Contract, carload, lump, bulk, 17.5c per lb of contained Si, carload packed 18.7c, ton lot 19.65c, less ton 20.7c. Delivered. Spot, add 0.25c.

Low-Aluminum 90-95% Ferrosilicon: (Al 0.50% max.) Add 0.7c to 90-95% ferrosilicon prices.

Silicon Metal: (Min. 97% Si and 1% max. Fe.) C.l. lump, bulk, regular 20.0c per lb of Si, c.l. packed 21.2c, ton lot 22.1c, less ton 23.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

Alsifer: (Approx. 20% Al, 40% Si, 40% Fe.) Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 9.90c per lb of alloy, ton lots packed 11.30c, 200 to 1999 lb 11.65c, smaller lots 12.15c.

Briquetted Alloys

Chromium Briquets: (Weighing approx. 3⅝ lb each and containing exactly 2 lb of Cr). Contract, carload, bulk, 14.50c per lb of briquet, carload packed 15.2c, ton lot 16.0c, less ton 16.9c. Delivered. Add 0.25 for notching. Spot, add 0.25c.

Ferromanganese Briquets: (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk 10.95c per lb of briquet, c.l. packaged 11.75c, ton lot 12.55c, less ton 13.45c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicomanganese Briquets: (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 11.15c, per lb of briquet, c.l. packed 11.95c, ton lot 12.75c, less ton 13.65c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

Silicon Briquets: (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si) Contract, carload, bulk 6.95c per lb of briquet, c.l. packed 7.75c, ton lot 8.55c, less ton 9.45c. Delivered. Spot, add 0.25c.

(Small size—weighing approx 2½ lb and containing exactly 1 lb of Si). Carload, bulk 7.1c, c.l. packed 7.9c, ton lot 8.7c, less ton 9.6c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.

Molybdic-Oxide Briquets: (Containing 2½ lb of Mo each) $1.14 per pound of Mo contained, f.o.b. Langeloth, Pa.

Calcium Alloys

Calcium-Manganese-Silicon: (Ca 16-20%, Mn 14-18% and Si 53-59%). Contract, carload, lump, bulk 20.0c per lb of alloy, carload packed 20.8c, ton lot 22.3c, less ton 23.3c. Delivered. Spot add 0.25c.

Calcium-Silicon: (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 19.0c per lb of alloy, carload packed 20.2c, ton lot 22.1c, less ton 23.6c. Delivered. Spot add 0.25c.

Titanium Alloys

Ferrotitanium, Low-Carbon: (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.) Contract, ton lots 2" x D, $1.50 per lb of contained Ti; less ton $1.55. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.) Ton lot $1.35, less ton $1.37, f.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot, add 5c.

Ferrotitanium, High-Carbon: (Ti 15-18%, C 6-8%). Contract $177 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destinations east of Mississippi river and north of Baltimore and St. Louis.

Ferrotitanium, Medium-Carbon: (Ti 17-21%, C 2-4.5%.) Contract, $195 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

Vanadium Alloys

Ferrovanadium: Open-hearth Grade (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $3.10 per lb of contained Va. Delivered, Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3.20. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.) $3.30.

Grainal: Vanadium Grainal No. 1, $1 per lb; No. 6, 68c; No. 79, 50c, freight allowed.

Vanadium Oxide: Contract, less carload lots $1.28 per lb contained V_2O_5, freight allowed. Spot, add 5c.

Zirconium Alloys

12-15% Zirconium Alloy: (Zr 12-15%, Si 30-43%, Fe 40-45%, C 0.20% max.). Contract, c.l. lump, bulk 7.0c per lb of alloy, c.l. packed 7.75c, ton lot 8.5c, less ton 9.35c. Delivered. Spot, add 0.25c.

35-40% Zirconium Alloy: (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract carload, lump, packed 20.25c per lb of alloy ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

Boron Alloys

Ferroboron: (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more, 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered, spot, add 5c. F.o.b. Washington, Pa., prices 100 lb and over are as follows: Grade A (10-14% B) 75c per pound; Grade B (14-18% B) $1.20; Grade C (19% min. B) $1.50.

Borosil: (3 to 4% B, 40 to 45% Si), $5.25 per lb contained B, delivered to destination.

Bortam: (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

Carbortam: (B 1 to 2%) contract, lump carloads 9.50c per lb, f.o.b. Suspension Bridge, N. Y., freight allowed same as high-carbon ferrotitanium.

Other Ferroalloys

Ferrocolumbium: (Cb 56-60%, Si 8% max., C 0.4% max.). Contract, ton lot, 2" x D, $4.90 per lb of contained Cb, less ton $4.95. Delivered. Spot, add 10c.

Ferrotantalum—Columbium: (Cb 40% approx., Ta 20% approx., and Cb and Ta 60% min., C 0.30 max.) ton lots, 2" x D, $3.75 per lb of contained Cb plus Ta, delivered; less ton lots $3.80.

Sileaz Alloy: (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, B 0.55-0.75%). Carload packed, 1" x D, 45c per lb of alloy, ton lot 47c, less ton 49c. Delivered.

SMZ Alloy: (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 17.5c per lb of alloy, ton lots 18.25c, less ton 19.5c. Delivered. Spot, add 0.25c.

Graphidox No. 4: (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 18c per lb of alloy; ton lots 19c; less ton lots 20.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

V-5 Foundry Alloy: (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 15c per lb of alloy, ton lots 16.50c; less ton lots 17.75c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

Simanal: (Approx. 20% each Si, Mn, Al; bal Fe) Lump, carload, bulk 14.50c, packed 15.50c; ton lots, packed, 15.75c; less ton lots, packed, 16.25c per lb of alloy, delivered to destination within United States.

Ferrophosphorus: (23-25% based on 24%, P content with unitage of $3 for each 1% of P above or below the base); carloads, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn., $65 per gross ton.

Ferromolybdenum: (55-75%). Per lb, contained Mo, f.o.b. Langeloth, $1.32; Washington, Pa., furnace, any quantity $1.13.

Technical Molybdic-Oxide: Per lb, contained Mo, f.o.b. Langeloth $1.14, packed in bags containing 20 lb of molybdenum; Washington, Pa., 95.00c.

Metalworking Briefs . . .

CONSTRUCTION—ENTERPRISE—ORGANIZATIONAL CHANGES

Signode Builds in Weirton

Signode Steel Strapping Co., Chicago, is supplementing its Weirton, W. Va., operations with a new 150 x 420-foot building. Employment will be increased from 25 to 150. Present factory will be used as a warehouse.

Besides slitting and edge-rolling steel, coloring, coating, rust-proofing, recoiling, wrapping and packaging operations conducted at present, the new plant will be able to process the largest coils manufactured by Weirton Steel Co. Signode sealing devices will be made by the company and lithographed at Weirton Metal Lithographing Co. nearby, says John H. Leslie, president of the Chicago company.

Frasse Builds Warehouse

Distribution of its alloy, stainless and cold-finished carbon steels and tubing in the Syracuse, N. Y., district will be consolidated in an 18,000-square foot office and warehouse being built there by Peter A. Frasse & Co. Inc., New York. New facilities will provide a 30 x 60-foot bay for shipping and receiving, large enough for loading or unloading four trucks at one time. The 60 x 200-foot stock bay and an additional 24 x 144-foot storage area will accommodate the 2500-ton capacity of the warehouse.

Wolff Adds Metal Decorating

Facilities for metal decorating, coating and process waxing have been installed at Benj. Wolff & Co., Chicago metal warehousing firm. The 116-foot lithographing line will handle a maximum sheet of 34 x 36-inches at a speed of 85 sheets per minute. Both this line and the 134-foot coating line have baking ovens.

Caldwell Buys in Rochester

Expansion of manufacturing by Caldwell Mfg. Co., Rochester, N. Y., caused the decision to buy a Rochester plant building of United Shoe Machinery Corp.

Baltimore Plant Reactivated

The Pittsburgh Mill Steel Co., New York, is preparing its plant in Baltimore for early production. Purchased in 1949 from the government's General Services Administration, the plant was not placed in operation under the then prevailing conditions. The property consists of 10 acres and 21 buildings, with a combined floor area of 190,000 square feet. The main foundry building comprises 65,000 square feet. William F. George is in charge of the Baltimore plant.

Berger Furnace Adds Space

Latest expansion of the Berger Furnace Mfg. Co., Pittsburgh, is the acquisition of new buildings and land covering approximately ten acres in Belle Vernon, Pa. These buildings offer an additional 200,000 square feet of space for one-floor manufacturing of the Berger line of heating equipment and supplies.

Magnetic Core Parts

Magnetic core parts for communications and electronic equipment will be produced at 6½ times the pre-Korea rate with the plant expansion of Magnetic Metals Co., Camden, N. J. The extra space will permit handling of 15 per cent more military production of precision nickel alloy core material than was processed during World War II.

Loewy Offers Design Service

Raymond Loewy Associates, New York, has opened a department of development engineering under Milo M. Dean. It will provide private manufacturers and government agencies with highly specialized technical design services.

Calstrip Adds Facilities

Facilities for producing cold-rolled strip steel are being expanded by California Cold Rolled Steel Corp., Los Angeles. Groundbreaking is under way on a new all-steel structure for housing three new controlled-atmosphere annealing furnaces. With installation of a four-high cold reduction mill, Calstrip will offer strip as light as 0.010-inch. Slitting capacity is being increased also.

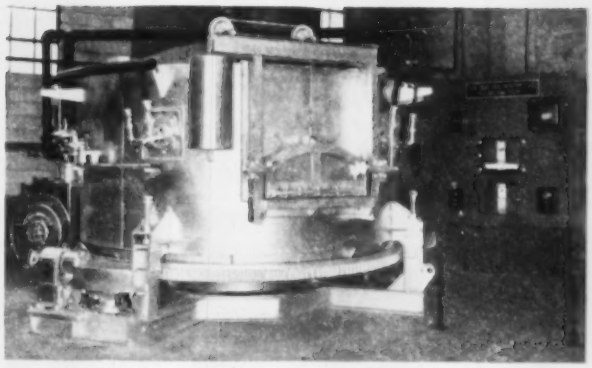
Aeroquip Acquires Subsidiary

All outstanding stock of Metalco Inc., Jackson, Mich., has been bought by Aeroquip Corp. of that city. Metalco has been a substantial contractor of Aeroquip, furnishing a variety of special hose fittings, tube bends and elbows used in Aeroquip hose assemblies. A plant in Cheboygan, Mich., has been leased to allow tripling floor space of Metalco and allow sizable manufacturing expansion.

Operation of the newly acquired company will be continued as a wholly owned subsidiary of Aeroquip, with Don Mortlock as vice president and general manager. Kenneth Meyerholtz, chief production engineer and plant superintendent of Aeroquip, was elected president of Metalco. Metalco's board of directors consists of Peter F. Hurst, Kenneth Meyerholtz and Fred W. Corwin, who is also secretary-treasurer of the company.

Mack Makes Assembly Pact

Under an agreement with Mack Trucks Inc., New York, Wool-



GASMACO'S
ROTARY HEARTH FURNACE

★ *Speeds Production . . .*
Reduces Costs . . .

Check these outstanding advantages of Gas Machinery Company's Rotary Hearth Furnace if your requirements are forging or annealing . . . heat-treating or drawing —

- ☐ UNIFORM HEATING
- ☐ HIGH EFFICIENCY
- ☐ LOW MAINTENANCE COSTS
- ☐ WATER SEALED HEARTH
- ☐ ONE OPERATOR
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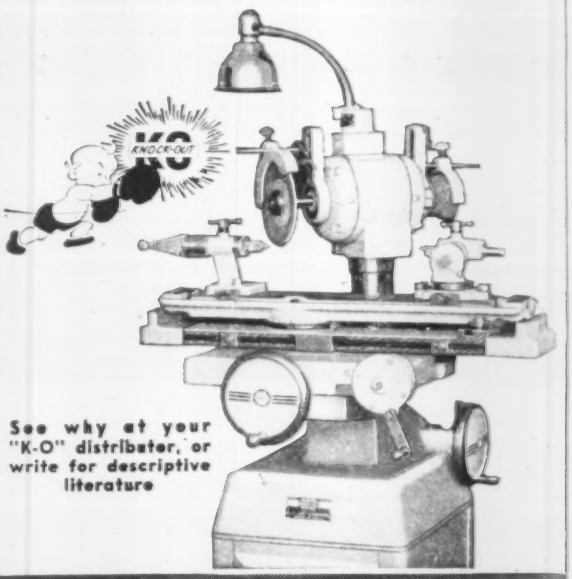

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...dge Mfg. Co. of Sunnydale, Calif., will partially produce and fully assemble Mack off-highway vehicles in its main Sunnydale plant. Plans are being rushed for construction of a new $250,000 assembly plant. The vehicles will be specially designed to fit the needs of western contractors, miners and loggers.

Reed Rolled Thread To Build

A completely new plant will be built in Worcester, Mass., by the Reed Rolled Thread Die Co. of that city. Improved plant layout and added equipment will enable the company to handle more efficiently the increased demand for thread rolling machines, dies, knurls and thread rolls.

Canada To Cut Auto Output

Canada, too, is feeling the steel pinch. A direct reduction in passenger car output is being considered. Cutbacks in other civilian production using steel will follow. The action will likely be put into effect as soon as Canada and the U. S. reach agreement on a standardized army vehicle to be built in Canada for the defense forces of both countries.

Buffalo Firm Changes Name

Stockholders of Electro Refractories & Alloys Corp., Buffalo, have approved a change in the corporation's name to Electro Refractories & Abrasives Corp. The change is effective Mar. 1, 1951. Two new directors were elected also: T. W. Campbell of Poland, O., and E. D. Cowlin of Canton, O. Mr. Campbell is sales engineer for Electro in the Youngstown area. Mr. Cowlin is general manager of the Reliance Division, Eaton Mfg. Co., in Massillon, O.

Space Leased In Twin Cities

In a move necessitated by expanding operations, United States Air Conditioning Corp., Minneapolis, has leased approximately 40,000 square feet of additional space in the twin cities for manufacturing and storage facilities. Involved in the transactions are 25,000 square feet in downtown St. Paul and 15,000 square feet in Minneapolis' Northwest Terminal.

Missile Valve Co. Organized

Roland Saye organized Missile Valve Co., 8945 Venice Blvd., Los Angeles 34, specializing in manufacture of valve assemblies.

Foundry Moves Office

Patterson Foundry & Machine Co., East Liverpool, O., moved its New York district office from RKO building, to the Empire State building.

Italian Bearings Offered

Officine di Villar Perosa, Turin, Italy, manufacturer of bearings, reappointed C & C Sales Corp., New York, as exclusive distributor in the United States and Canada. The Italian firm, a subsidiary of Fiat, is one of the largest producers of ball and roller bearings in the world. The company can make deliveries of bearings within 60 to 90 days.

Chromium Plant Expanded

Mutual Chemical Co. of America, New York, has completed construction of a chromium chemical plant on the Baltimore harbor, adjacent to previously constructed facilities. With these additional facilities, Mutual's productive capacity is increased substantially.

Cleveland Office Established

Associated Spring Corp., Bristol, Conn., established a Cleveland office at 903 NBC Bldg. Walter Bertram is in charge, assisted by John L. Butler Jr.

Hyster Expands Facilities

Hyster Co., Portland, Oreg., is increasing its manufacturing capacity at least one-third through enlargement of fabricating and machining facilities at its plants in that city, and in Peoria and Danville, Ill. The company makes lift trucks and tractor attachments.

Standard Sheet Metal Moves

Standard Sheet Metal Co.—sheet metal fabricator—moved from 1111 Hunter St., Baltimore, into larger quarters at 245-255 S. Bethel St., that city, where it occupies 8300 square feet.

Utility To Spend $29 Million

Consolidated Gas, Electric Light & Power Co., Baltimore, proposes to spend $29 million for additional facilities this year. Included is completion of work on a fourth electric generator unit at its Riverside plant and advancement of work on a third generating unit at its Gould street plant. This latter is expected to be completed next year. Other projects include three new sub-stations and the increasing of capacity at nine present sub-stations.

Plane Builder Leases Space

Glenn L. Martin Co., Middle River, Md., has leased 130,000 square feet in a building at E. Fayette and Oldham streets, Baltimore. While this space may be used largely for storage, it is considered possible that some assembly work will also be carried on.

Harbison-Walker Expands

Harbison-Walker Refractories Co.—manufacturer of magnesite, chrome and fosterite brick, cement and other similar products—is erecting an addition to its Baltimore plant. When placed in operation it will increase the plant's capacity by at least 20 per cent.

Business on the Move

An interesting feature of the expansion program at Republic Steel Co.'s Cleveland Works is the

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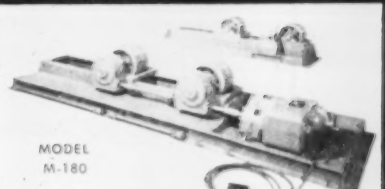
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moving and relocation of a two-story brick office building. The building, 41 x 120-feet, is being moved intact by Eichleay Corp., Pittsburgh, while service in the building goes on as usual.

Arcos Opens Chicago Office

Arcos Corp., Philadelphia, is opening a sales office and warehouse in Chicago. Walter Gordon List is the district manager. The company manufactures stainless, alloy and nonferrous arc welding electrodes.

Brooks Boiler Changes Name

Brooks Boiler Treatment Co. changed its name to Brooks Chemicals Inc., Cleveland. Dean J. Wilkison was elected president. Other officers are: Fred J. Mack, vice president and secretary; Alfred B. Garson, treasurer; and G. D. Lancaster, chief chemist.

New Atomic Project Studied

Preliminary engineering studies will begin immediately in connection with the atomic energy development work to be undertaken on part of the former Weldon Spring Ordnance plant, Weldon Spring, Mo. Exact nature of the work to be undertaken at the plant has not been divulged. Previously, it had been reported the Atomic Energy Commission planned to establish a $100 million atomic energy project in that area.

Controls Firm Builds in West

Robertshaw-Fulton Controls Co., Greensburg, Pa., is erecting a plant at Anaheim, Calif. The plant will be equipped to manufacture automatic controls used in home appliances, industrial processes, transportation equipment, shipping and aircraft.

Mullins Books Shell Order

Mullins Mfg. Corp., Salem, O., booked another $9,950,000 order from the Army Ordnance Department for artillery shells. Its Liberty plant in Warren, O., is scheduled to produce 1 million shells. Previously the company had booked a $4 million mortar shell order and another for $5 million for artillery shells. The Liberty plant is in a building formerly occupied by Liberty Steel Co., a hand tin plate mill. More recently the plant had been used as a warehouse.

Baldwin Buys Austin-Western

Assets and business of Austin-Western Co., Aurora, Ill., are now a part of Baldwin-Lima-Hamilton Corp., Eddystone, Pa. Austin-Western will continue to serve its customers under its own name. The company produces road making and maintenance, rock crushing, street cleaning and earth handling equipment.

Shell Contract Placed

Rheem Mfg. Co., New York, received a $2.5 million contract for shell components, to be manufactured at its San Pablo, Calif., ordnance plant. This is the first shell contract to be awarded in the San Francisco ordnance district.

Airesearch Building Boosters

Airesearch Mfg. Co., subsidiary of Garrett Corp., both of Los Angeles, is producing 50-caliber ammunition boosters for United States Army tanks. The contract amounts to about $500,000. These boosters are powered by small high-speed electric motors and are capable of operating 30 per cent faster than the firing rate of the gun. Airesearch is manufacturing similar equipment for aircraft guns.

Allied Steel Plans New Plant

Allied Steel Products Corp.—warehouse steel and fabrication—Kenilworth, N. J., will erect a $100,000 plant at Newport, Del.

Scrap Institute Moves

Institute of Scrap Iron & Steel Inc. is occupying new headquarters in the Editors' Bldg., 1729 H St. NW, Washington. The Institute's national offices formerly were located at 1346 Connecticut Ave., that city.

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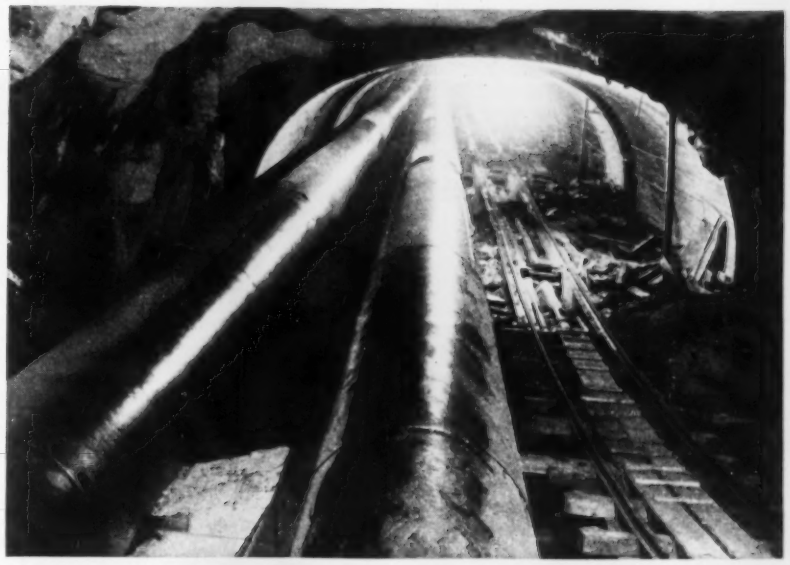
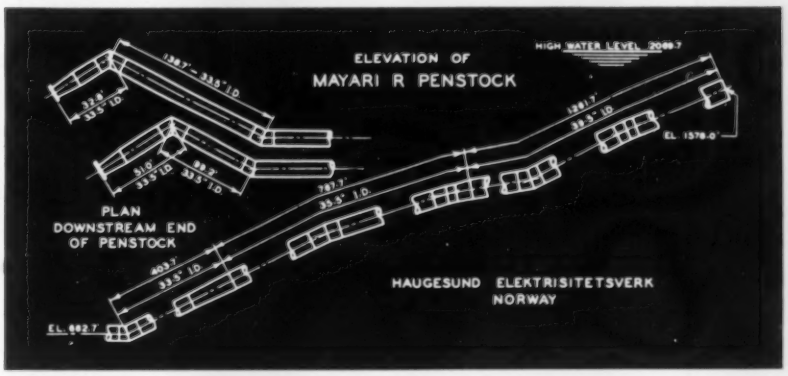


The thickness of the Mayari R plates vary from 5/16-in. at the upper end of these penstocks, to 5/8-in. at the lower end. Inside diameters of the penstocks range from 39 1/2-in. down to 33 1/2-in.



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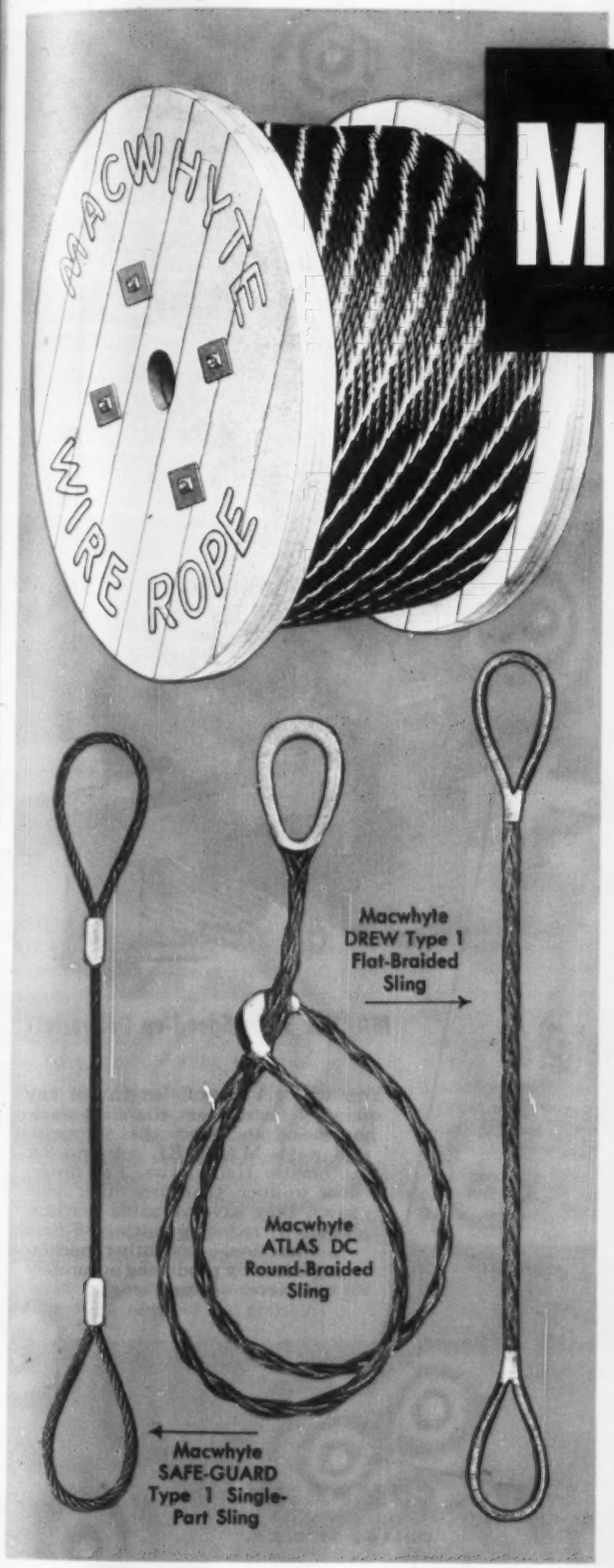

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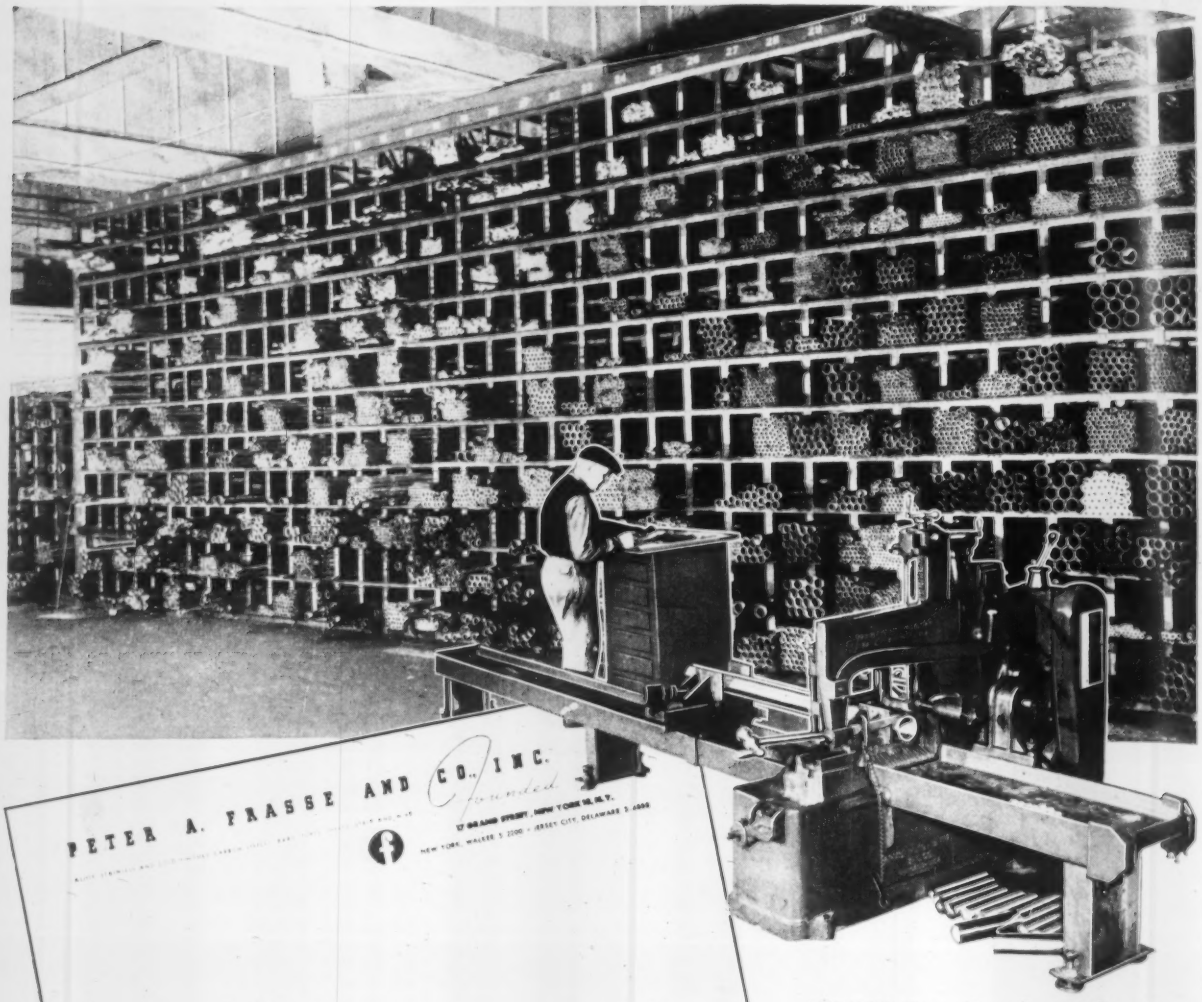

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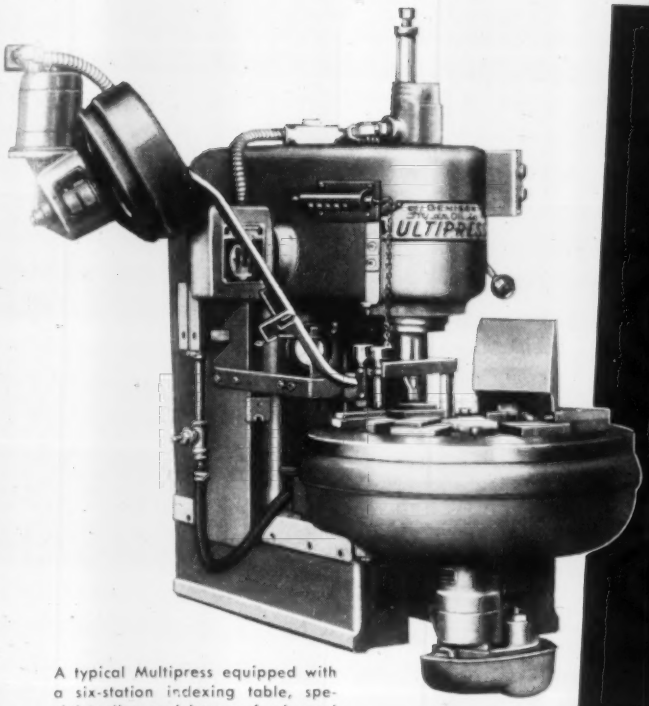
Metal Cutting

MARVEL SAWS

Better Machines-Better Blades



A typical Multipress equipped with a six-station indexing table, special tooling and hopper feed, used to rivet electrical contacts on brass and spring steel contact arms.

MULTIPRESS® is the answer to FASTER BETTER SAFER PRODUCTION for hundreds of operations

With Accurate Pressure Control Plus Wide-Range Adjustability, Multipress Offers Unique Production Advantages

SMOOTH, ACCURATE, OIL-HYDRAULIC ACTION, specially engineered for production speed and efficiency, plus quick, easy, wide-range adjustability! That's what enables Multipress to make cost-cutting news on so many different types of jobs!

More than *six-thousand Multipresses* now offer working proof of this ability to speed production, improve quality, reduce rejects and scrap losses, increase safety, cut worker fatigue, reduce die wear, and slash costs.

A quick review of a few Multipress features will show why!

Pressure is infinitely adjustable, within the full pressure range of the press.

Pressing and approach speeds can be adjusted separately, to combine rapid traverse with controlled working speeds.

Ram stroke can be preset for either distance or pressure limits.

Controls for time delay, or ram dwell, and many sequence requirements are available.

Exclusive Multipress Vibratory Ram Action—ram effort applied in a series of short, rapid, full-tonnage strokes in each cycle—is also available.

Multipress can be equipped for either manual or automatic ram control, with dual levers or push buttons for extra safety.

Highly compact Multipress design requires minimum floor space and head room . . . gives maximum advantage in locating parts bins, tote boxes, hopper feeds, conveyor equipment, and other accessories.

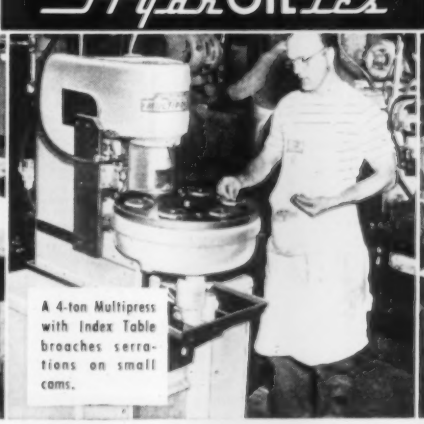
Indexing tables and dial feed tables for feeding parts to the press ram automatically, are standard Multipress accessories. Others include harmonic stock feed, straightening fixtures, pelleting equipment, and a foil marking attachment.

• • • •

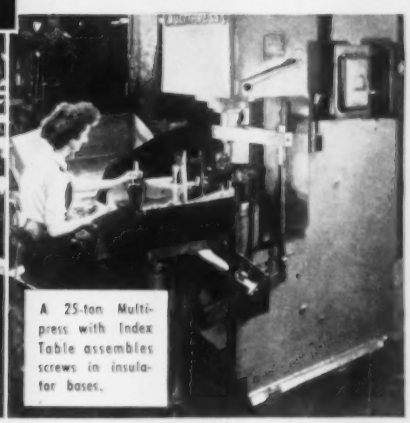
Multipress is tailored to individual production needs, in eight different frame sizes, with capacities from 1 ton up to the 50-ton range. For more information, write The Denison Engineering Company, 1163 Dublin Road, Columbus 16, Ohio.

DENISON HydrOILics

8-ton Multipress used by famous radio maker in producing speaker assemblies.



A 4-ton Multipress with Index Table broaches serrations on small cams.

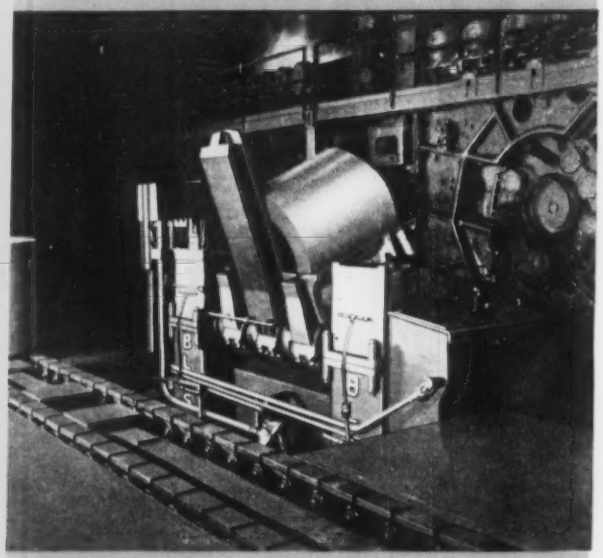


A 25-ton Multipress with Index Table assembles screws in insulator bases.

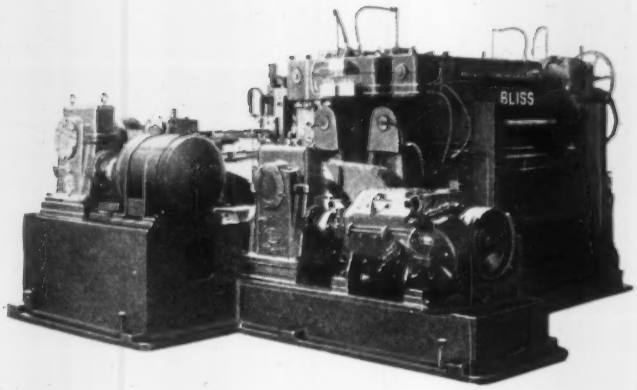
HOW BLISS DESIGNS FOR STEEL, BRASS

PRIMARY METAL PLANTS use hundreds of Bliss special-purpose machines in conjunction with hot and cold reduction mills. In every case, backed by field research with industry's engineers, Bliss has drawn upon its engineering skills to create equipment combining the necessary ruggedness and precision for the job at hand.

Pictured on these pages are typical exam-

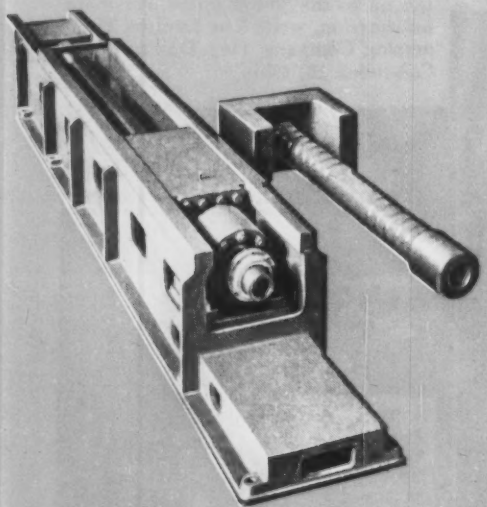


COIL UPENDER strips hot 25,000-pound coils from the Mandrel Coiler, upends and deposits them on a "waffle top," which in turn deposits coils on the moving conveyor strands without damage to coil edges.

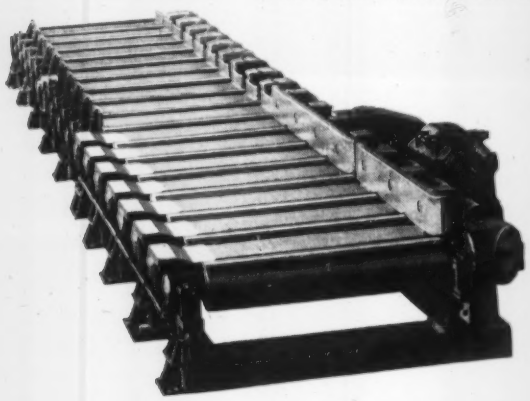


13 ROLL BREAKER produces scale-free and inclusion-free product which is suited for final reduction operations.

RUN OUT DELIVERY TABLE specially designed by Bliss has slab sweep-off sections opposite piler. A slab pusher is provided on one side.



ROLL CHANGER WITH SLIDING RAIL permits easy roll removal from the mill and reduces required crane capacity. Balance bar is used to handle work roll assemblies including chocks and bearings.



AUXILIARY EQUIPMENT AND ALUMINUM MILLS

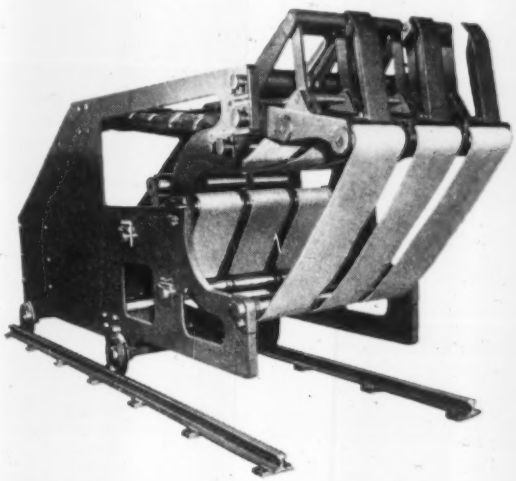
ples of mill accessory equipment designed by Bliss. The complete range is described and illustrated in a new 52-page brochure soon to be published. You can reserve your copy now.

Next time you need auxiliary mill equipment, call in Bliss engineers.

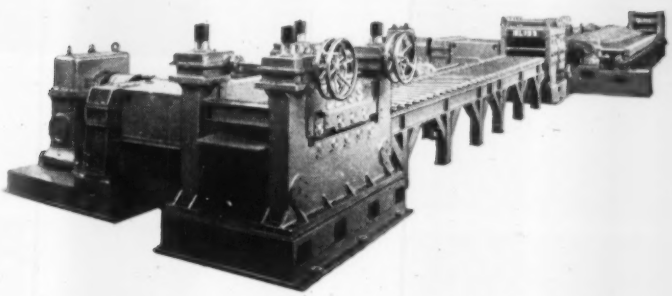
E. W. BLISS COMPANY

General Office: CANTON, OHIO

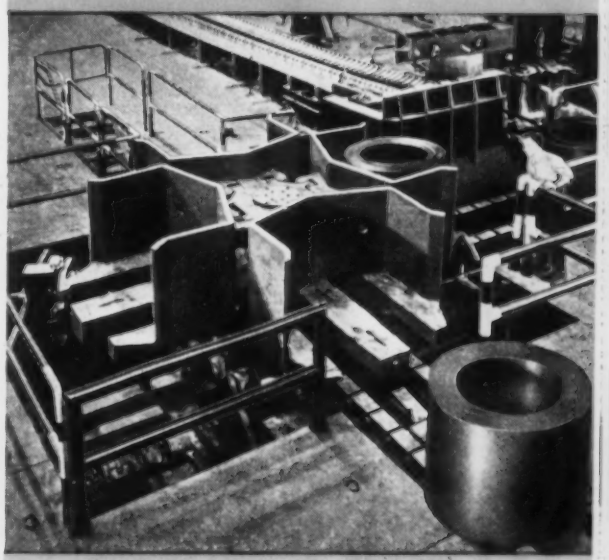
Rolling Mill Division: SALEM, OHIO



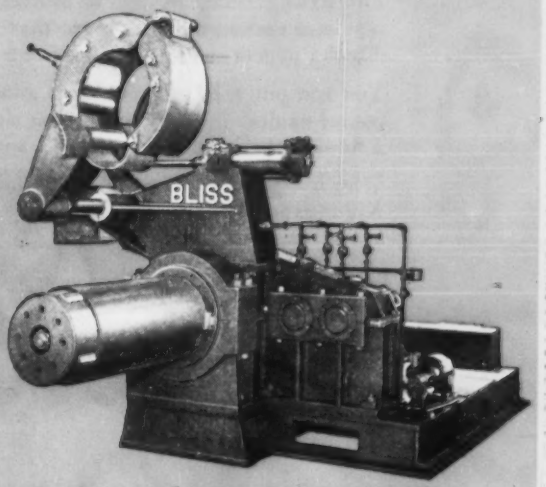
WIDE HORIZONTAL-TYPE BELT WRAPPER is used in conjunction with Tension Reel to coil strip on the fly into tight, uniformly wound coils.



COMBINATION LEVELER AND SLAB MILLER levels the slab, mills one side, turns the bar over and mills the other side. It is used in brass and aluminum mills to prepare metal for final cold reduction.



COIL LIFT AND TURN-AROUND UNIT **transfers coils weighing up to 30,000 pounds from one leg of conveyor to another. It operates at either 90° or 180°. Perfect coil edges are retained.**



TENSION REEL AND BELT WRAPPER **handles 30,000-pound coils. Forced-circulation oil lubrication pump and piping are shown clearly on the typical Bliss gear reduction unit.**

Where is the safest place to keep your documents?

Are your contracts, blueprints, accounts receivable—the records that keep your business going—really safe?

If you've ever seen business papers charred by fire . . . or made illegible by water from fire fighting, you'll want to make sure it can't happen to your records.

Wherever you store these papers, you can rely on a *Kidde* Fire Extinguishing System to protect them. A Kidde System uses carbon dioxide—a gas that won't mark, stain or discolor papers—and it puts out fire *fast*.

You can put a Kidde system on guard over one or many record vaults . . . ready at the first sign of flame to release a fire-smothering cloud of CO_2 . . . and do it *automatically*.

Why not go *all the way* in protecting your papers. Call a Kidde expert for full information.

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Our severest critics are right in our own plant!

★

Contrasting with the constant pressure for production in other departments at Warner & Swasey is the calm, methodical work of one group of our men. These men are our severest critics—our final inspectors.

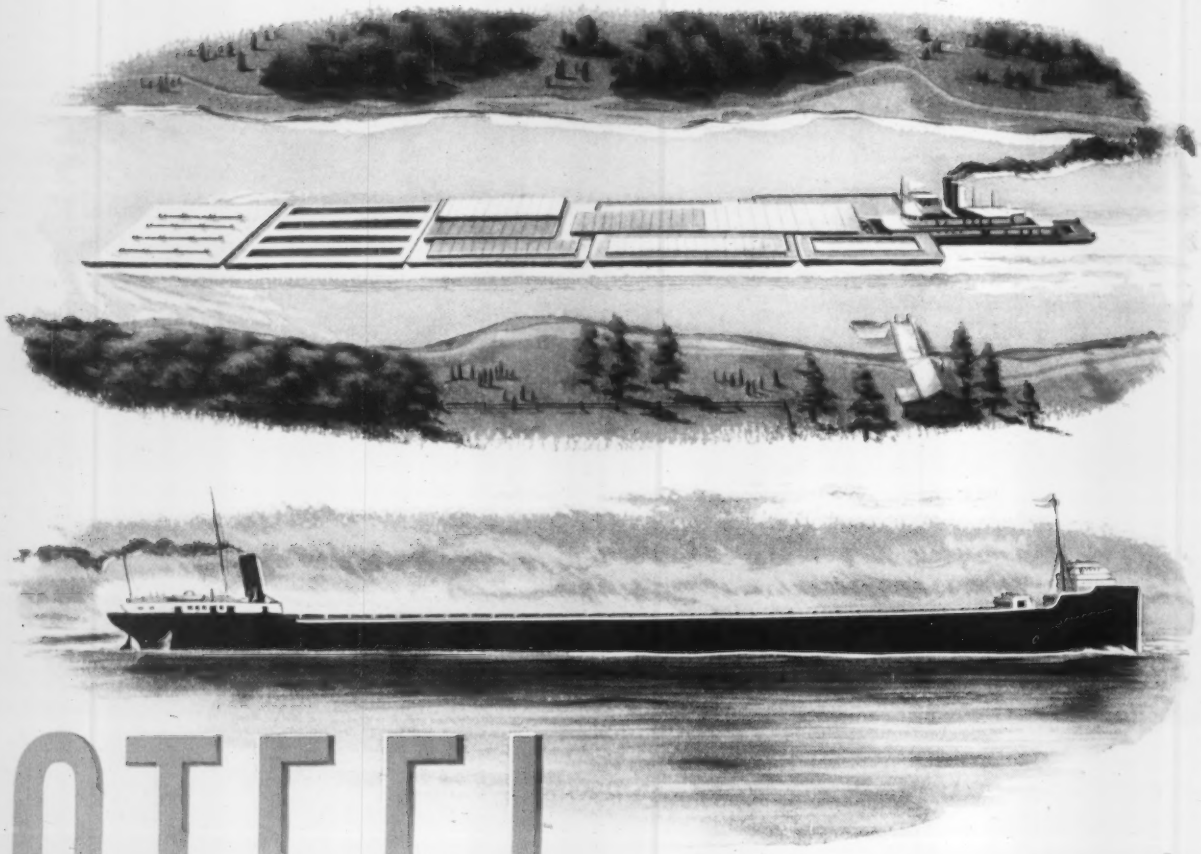
By the time an assembled turret lathe reaches one of these final inspectors, its individual parts have already passed 15,000 inspections!

But that is not enough! The final inspector carefully rechecks the completed machine—*proves* beyond doubt that it is ready to turn out the high precision work for which it is designed. Only then does he *sign his name* to a written report certifying that the turret lathe he passes is as perfect as human skill can make it.

Like our other departments, "final inspection" is working day and night to get machine tools to our shipping platform on schedule. But despite stepped-up production and urgent delivery dates, *no* machine leaves our plant until it meets the long-established Warner & Swasey standards for accuracy and dependability.

WARNER & SWASEY
Cleveland
Machine Tools
Textile Machinery

YOU CAN MACHINE IT BETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATHES, AUTOMATICS AND TAPPING MACHINES



STEEL

THE VEHICLE OF DEFENSE

Without steel there would be little or no movement of men and material . . . there would be little or no defense.

To meet the nation's growing defense needs, every steelmaker is expanding his facilities to produce more and more steel.

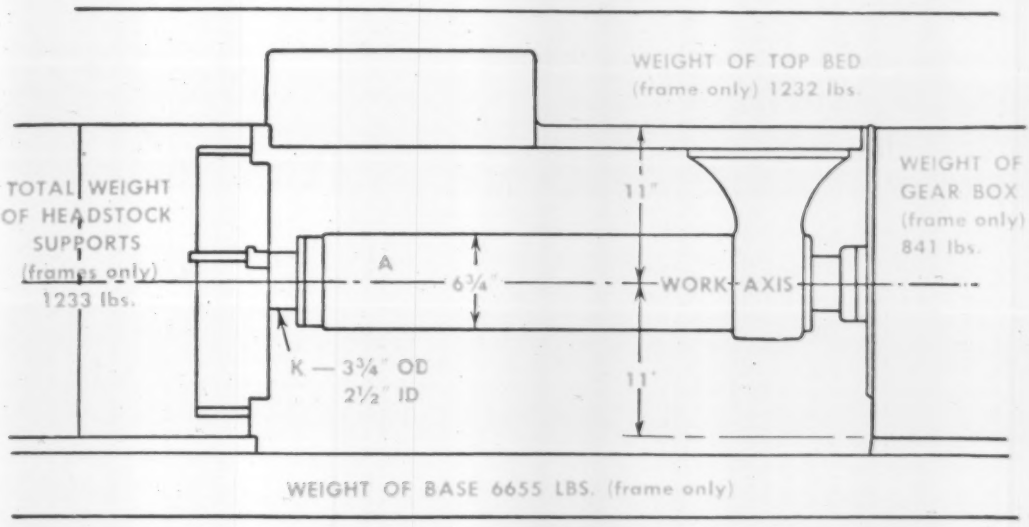
But to get more steel, America must first enlarge the shipping facilities that will be required to move vastly increased quantities of raw materials from mine to mill. More giant ships for the transport of iron ore—more sturdy river barges for the transport of coal—are urgently needed *now!*

Weirton Steel Company, pledged to participate in defense measures in any way and to any required degree, is supplying steel on approved allocation to hasten the increase of America's inland fleet.

WEIRTON STEEL COMPANY

WEIRTON, WEST VIRGINIA

NATIONAL STEEL CORPORATION



MAKER OF "HISTORIES"

The above drawing illustrates a Tooling Area that has staged many outstanding cases of machine adaptation and performance. Case histories are very useful as examples of machine adaptation, but their blanket use as unqualified proof of dependable performance is not convincing.

Buyers know that varying requirements and conditions of various plants make "buying what the other fellow buys" an unsafe practice. They know that good case histories will result if machine facilities have been properly selected. No plant could long afford to have it otherwise.

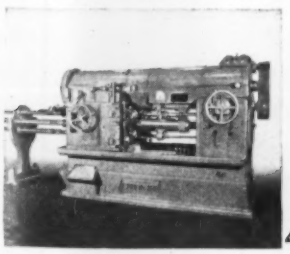
A "top performer" of the 1½" SIX SPINDLE CONOMATIC TOOLING AREA, shown above, is the MAIN END SLIDE. The specific data given tells why:

1. **It has a greater maximum load recommendation and a stronger frame support than the main end slide of any other "automatic".**

The 272 lb. alloy carburized steel Main End Slide, A, is 33⅝" long, and has a maximum load recommendation of 4800 ft. lbs. Its round surface is machined to close limits. It is supported in nickel iron, split, sleeves on the alloy steel Way, K, with a total bearing of 136.9 sq. ins.

2. **It handles more work; has more adaptable tooling positions, and more selective feeds, than the main end slide of any other "automatic".**

The 27⅞" tooling-length of the Slide handles shaft jobs up to 18" in length. The 2⅝" swing clearance permits die-head threading to full machine capacity in any, or all, six positions without Slide alteration. Nine pairs of pick-off gears give 68 feed changes for each work spindle speed.



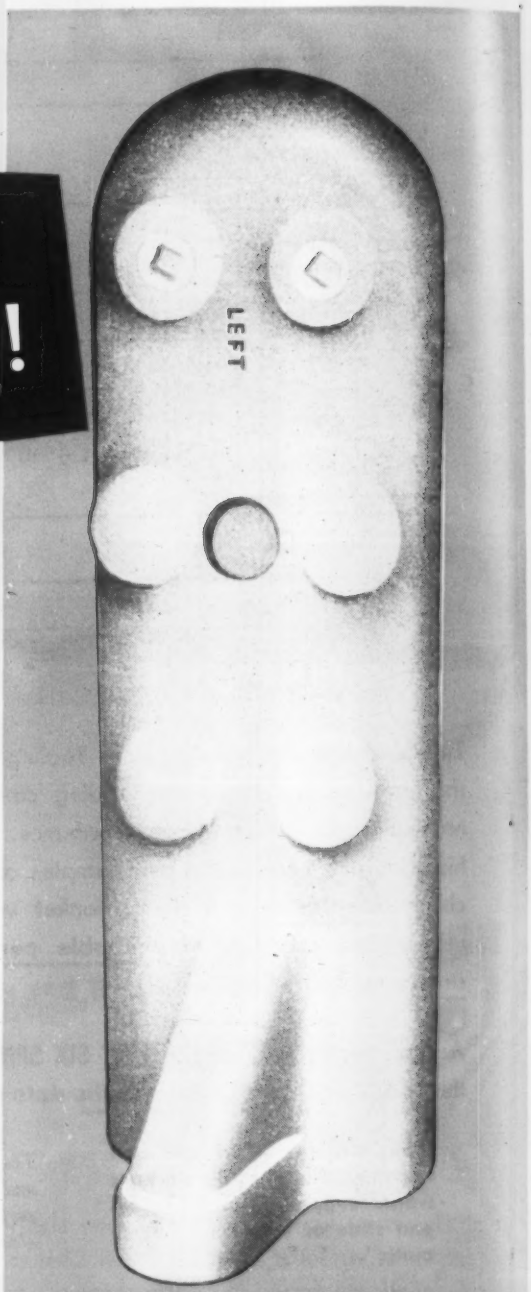
Buyer's Comparison Chart will guide you to full information

A Comparison of ALL Automatics is in Favor of Cone

Conomatic

CONE AUTOMATIC
MACHINE COMPANY, INC.
WINDSOR, VT., U.S.A.

THIS CASTING SAVED $12,000.00!



Why an Electrode Holder, redesigned by National Bearing Division, lasted over 73 times longer

A large Midwest plant was getting 5 days service from furnace electrode holders . . . before a trial order was placed with National Bearing Division. This plant saved dollars—*right from the start.* A special copper alloy permitted sound, dense castings at no sacrifice in electrical conductivity. Result? *30 days service—instead of 5—before replacement.*

On the next order, National Bearing Division engineers submitted a new design for the clamp—for greater strength and resistance to cracking. The redesigned electrode holders are still in use—after a year of trouble-free operation! They've saved $12,000.00 on replacement costs and furnace maintenance.

Better, longer-lasting non-ferrous parts can save money in your plant or product . . .

National Bearing Division has complete facilities for finding practical, economical solutions to non-ferrous bearing and casting problems. Investigate these complete facilities—whether your problem requires designed engineering service, or production of non-ferrous parts to your own specifications.

If you design, specify or purchase . . . *This catalog will interest you*

Find out how complete facilities for Research, Engineering and Production can reduce costs of non-ferrous parts in your plant or product. Write for a free copy of this catalog.

NBM

AMERICAN Brake Shoe COMPANY

NATIONAL BEARING DIVISION

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What's YOUR problem?

• Troubled with fingerprint corrosion? Are parts rusting between machining and assembly? Do you get customer complaints because of rusted shipments? These and a score of other troublesome problems can be eliminated with the use of the right STANORUST Rust Preventive.

To help you get the maximum benefit from the STANORUSTS, Standard Oil has a corps of lubricating specialists located throughout the Midwest. One of these men is near your plant. You can get his services quickly and easily. His wide experience and special training in rust prevention will help you make real savings. Why not arrange today for his visit by calling the nearest Standard Oil (Indiana) office?

8 grades of STANORUST

STANORUST No. 3-FP
is a fingerprint remover. It can be used to eliminate the cause of fingerprint corrosion and to deposit a protective film in one simple dipping operation.

STANORUST No. 4-V
has a Stoddard-solvent base which evaporates to leave a thin film for temporary rust prevention.

STANORUST No. 12
provides economical protection under average indoor conditions. It can be applied cold.

STANORUST No. 95
is designed for protection of parts in moderately severe indoor storage. It also can be applied cold.

STANORUST S-1
is a semi-fluid product, designed to give protection over a longer period than the No. 95 grade. It is suitable for outdoor service, if parts are under cover.

STANORUST 1-XC
is a non-fluid product which is recommended for protection of parts under severe outdoor conditions. It has been thinned with a volatile solvent and can be applied cold with a swab or brush.

STANORUST 3-X
is a soft, grease-like product and offers protection against severe indoor storage and moderately severe outdoor conditions.

STANORUST 6-X
is a heavy, petrolatum-type product that protects against the most severe outdoor exposure. It meets a government specification which includes a requirement that it protect against corrosion for a period of not less than 10 years without renewal.

For maximum protection against rust . . .

• STANORUST Rust Preventives offer maximum protection against rust because they contain a moisture-displacement additive which makes them far superior to straight mineral oils or to petrolatums frequently used for rust prevention.

The STANORUSTS have been thoroughly tested and proved effective on a wide variety of rust prevention jobs, ranging from elimination of fingerprint corrosion to protection of equipment under severe outdoor storage conditions.

The complete STANORUST line is briefly described at the right. The booklet offered will bring you complete details. You can secure a copy by calling the local Standard Oil (Indiana) office or by writing 910 South Michigan Avenue, Chicago 80, Illinois.

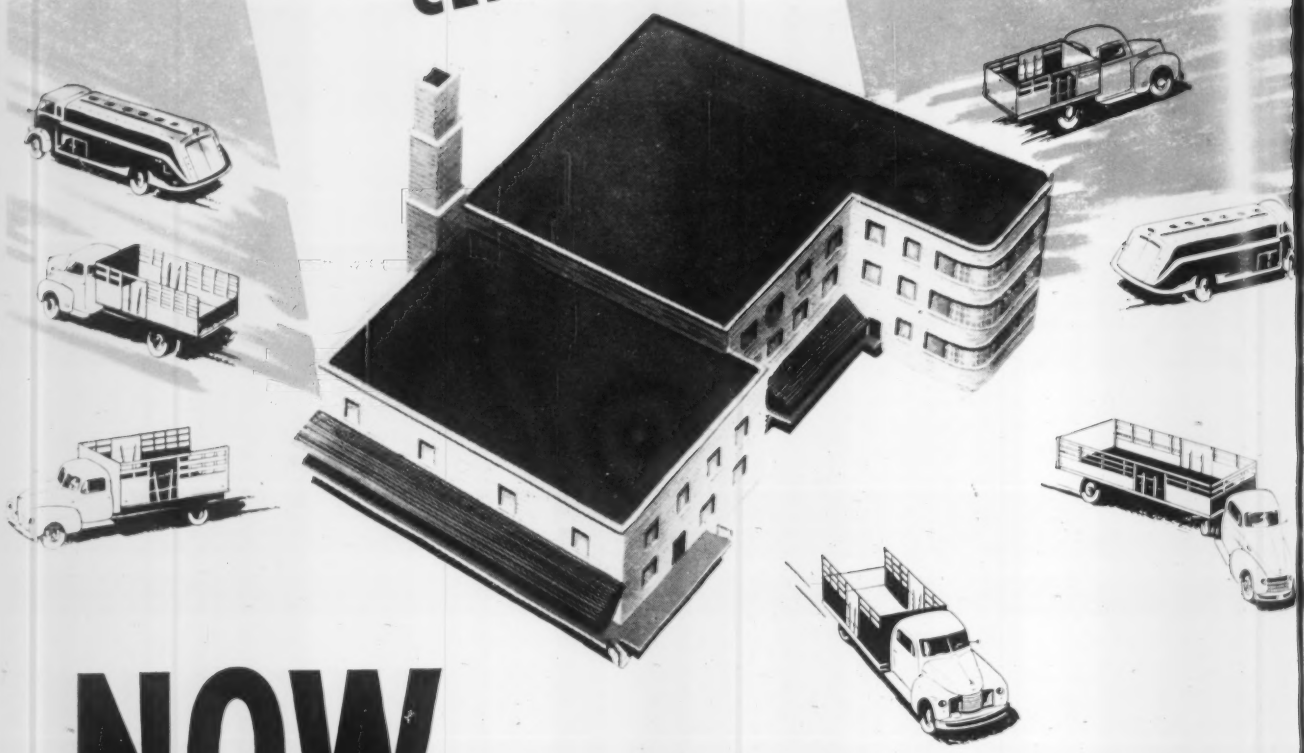
STANORUST
REG. U. S. PAT. OFF.
RUST PREVENTIVES

SEND FOR THIS BOOKLET

STANDARD OIL COMPANY (INDIANA)

STANDARD

STANDARD'S SERVICE-SUPPLY CENTERS



NOW more important than ever to you

You are, or may soon be, shifting your production setup to meet the coun rearmament needs. New machines, new operations, and faster production sch ules will demand some revision of your lubrication practices. That's why Sta ard's Service-Supply organization is now more important than ever to yo

Standard has a service-supply warehouse within a short truck-hauling d tance from your plant.

If you are a Standard Oil customer this warehouse will stock every lu cant used in your plant. Deliveries can be made in a few hours if necessar

In addition, this service-supply center is headquarters for a Standard Oi brication specialist who is assigned to your plant. He is close at hand to give help when you need it. He has plenty of practical experience. He has been s cially trained for his job in a Standard Oil Lubrication Engineering Schoo is backed by Standard Oil's extensive research and technical facilities.

To arrange for his visit, phone your nearby Standard Oil Service-Supply ter or write to: Standard Oil Company (Indiana), 910 South Michigan Ave Chicago 80, Illinois.

STANDARD

STANDARD OIL COMPANY (INDIAN

M. & M. DUPLEX MILLING AND CENTERING MACHINE

Part — automotive pinion
Operation — mill both ends and center drill
Production — 220 pieces per hour at 100%

FOR HIGHER PRODUCTION

Combine Operations

ON MOTCH & MERRYWEATHER SPECIAL MACHINES

The Motch & Merryweather milling head features rigidity at the tool point.

You can be sure of getting higher production with lower cost per piece by using Motch & Merryweather machines designed for multiple operations. The machine pictured here mills and center drills a vast range of parts, some of which are shown in white above. Our representative will help you obtain thorough-going accuracy, together with *production, PRODUCTION,* and *MORE PRODUCTION.* Contact us *now.*

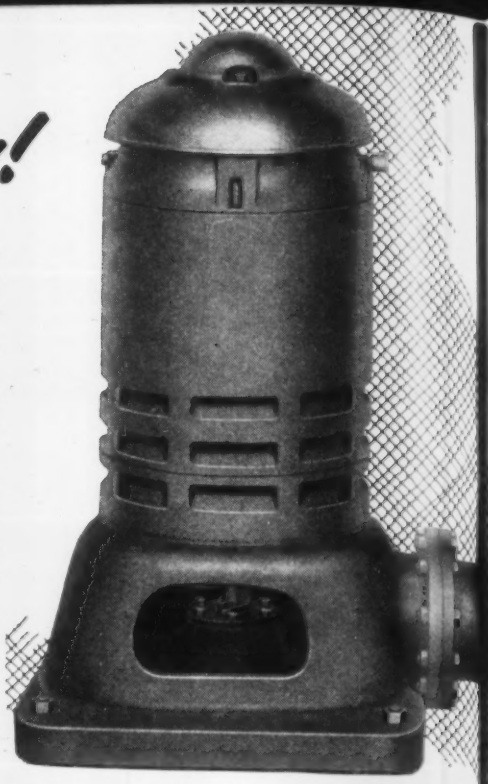
Manufactured by

THE MOTCH & MERRYWEATHER MACHINERY COMPANY
715 PENTON BUILDING • CLEVELAND 13, OHIO

Builders of Circular Sawing Equipment, Production Milling, Automatic and Special Machines

PRODUCTION-WITH-ACCURACY MACHINES AND EQUIPMENT

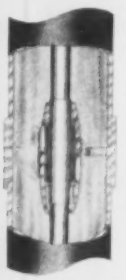
WHEN YOU LOOK TO TOMORROW . . . *today!*



Tomorrow's performance of the pumps you select *today* is an important first consideration! Will they be efficient for years . . . will they be easy and economical to service and maintain? These are the questions that should guide today's pump buyer.

In Fairbanks-Morse Pumps, you can be sure of these important advantages. Take the Fairbanks-Morse Pomona Vertical Deepwell Turbine Pump, for example. A new, water-lubricated external sleeve bearing assembly assures longer life wearing surfaces . . . minimum friction and shaft bearing losses . . . simple, easy replacement of worn sleeves.

This new feature and the many other Pomona advantages are your assurance that the pump you buy today will be efficient and economical tomorrow . . . *and for years to come.*



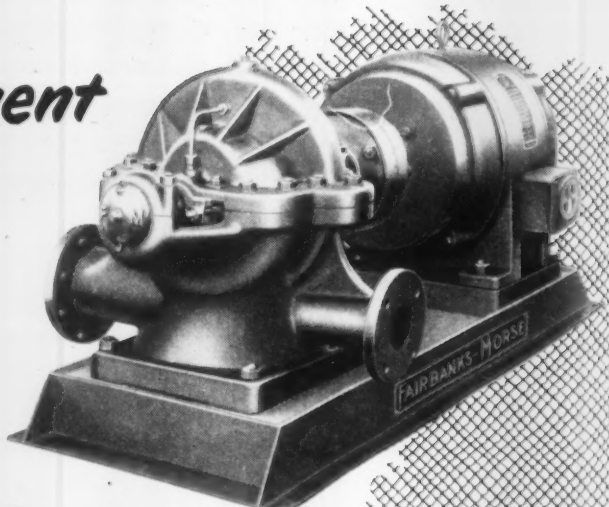
Water lubricated, external sleeve bearing assemblies assure maximum life for bearing assemblies without sacrifice of line shaft streamlining or bowl efficiencies.

FAIRBANKS

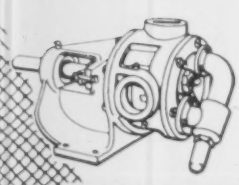
A NAME WORTH R

AND, FOR ANY *Pumping Requirement*

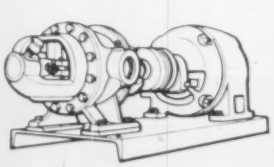
. . . you'll find a dependable, efficient Fairbanks-Morse Pump that will give you a new conception of low-cost pumping. Whether you need a centrifugal . . . a rotary . . . sewage or trash pump . . . turbine . . . vertical or horizontal angle-flow, you'll find the size and capacity you want in the Fairbanks-Morse line. This completeness of line is an important advantage to you . . . you can simplify your ordering . . . your parts and service . . . your inventory by standardizing on a single source, Fairbanks-Morse.



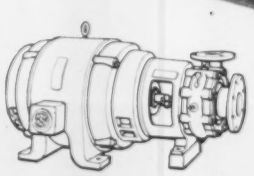
Horizontally split case centrifugal pump



Rotary pumps



Westco Turbine pumps

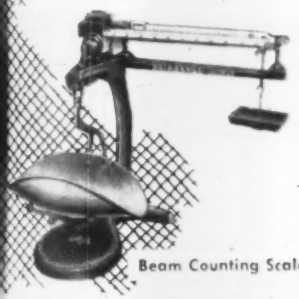


Builtogether centrifugal pumps

YOU CAN *Count* ON THIS SCALE . . .

You can count small parts or pieces, with Fairbanks-Morse Counting Scales easily and accurately *by weight!* They save time . . . save money . . . eliminate errors. Whether you manufacture or buy small parts in quantity, these accurate counting scales are one of your biggest aids in inventory control, in estimating cost work and in determining the volume of piecework.

With the *exact* counts you get, you eliminate the possible loss of customer good will over "short count" shipments . . . assure better labor relations through accurate piecework records and less fatiguing inventory work. You'll find it pays to "count on" a Fairbanks-Morse Counting Scale.



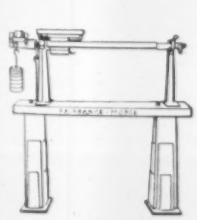
Beam Counting Scale

Dial Counting Scale

S MORSE
H REMEMBERING

AND, TO SPEED AND SIMPLIFY
Industrial Weighing

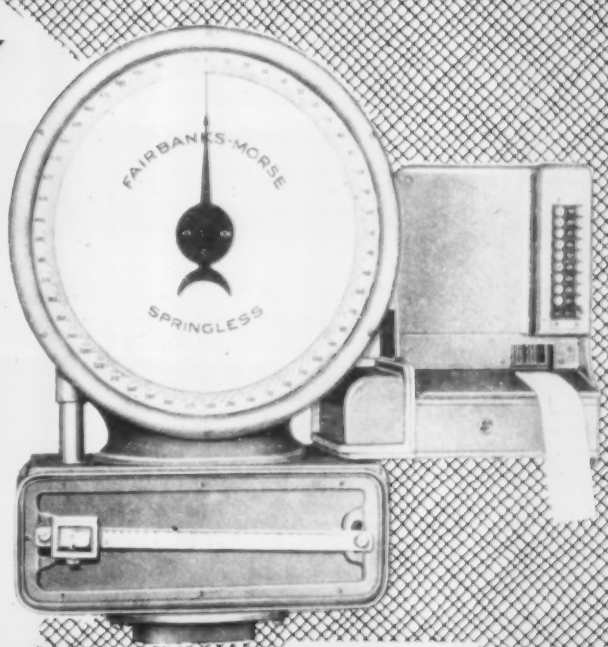
. . . you'll find the complete line of Fairbanks-Morse Scales your best answer. These accurate weighing instruments make reading easy . . . minimize the chance for human error. Designed for sustained accuracy, these dependable weighing instruments cut the costly little weighing errors that can mount up to so much lost profit. Your Fairbanks-Morse weighing expert will be happy to check your weighing operations with an eye to elimination of costly errors and faster weighing operations.



Full Capacity Beam Scale

Bench Dial Scale

Portable Dial scale



Printomatic Dial Scale

..YOU WANT THIS ROTOR DESIGN...

It's Copperspun!

If you buy or use motors, chances are that most of them are of the polyphase squirrel cage type — the most widely used class of integral horsepower motors made — for sustained heavy-duty drives in almost every class of service.

In rotor design, such service separates the good from the poor — and highlights your need for Fairbanks-Morse motors with Copperspun rotors, made through an exclusive centrifugal casting procedure developed by Fairbanks-Morse.

For in Copperspun rotors, you get the benefits of superior electrical characteristics — plus a design that is mechanically stronger for withstanding the most severe working conditions.

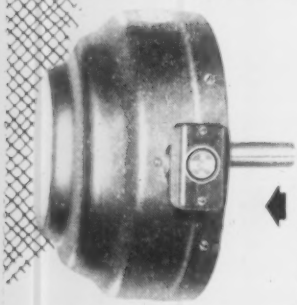
FAIRBANKS

A NAME WORTH

FOR POLYPHASE SQUIRREL-CAGE MOTORS

with Copperspun Rotors!

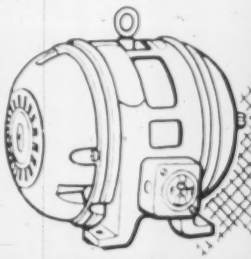
Here are a few in the complete Fairbanks-Morse line



GENERAL PURPOSE, drip-proof motors mountable in any position with full protection against flying chips, falling particles, dripping liquids, etc.

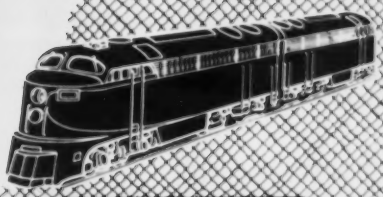
AXIAL AIR-GAP MOTORS: Averaging 30% lighter and 40% shorter overall—with flywheel effect three times that of corresponding ratings of conventional motors. Add to appearance, decrease size and weight of any driven machine. Meet all AIEE and NEMA standards.

TOTALLY ENCLOSED FAN-COOLED motors operate economically, safely under adverse conditions, including corrosive gas, vapors, steam or where metallic particles, abrasive dust and or other materials are in the air. Available with Underwriters labels for use in Class 2, Group G hazardous locations.



Why Our Best Customer is Hard to Satisfy

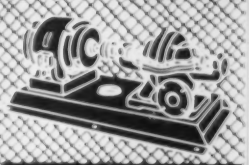
Perhaps the "best customer" for Fairbanks-Morse products is Fairbanks-Morse itself — for all Fairbanks-Morse products are components of and/or used in the manufacture of all other Fairbanks-Morse products. Fairbanks-Morse diesel locomotives, for instance, prove up the design advantages of Fairbanks-Morse Opposed-Piston diesel engines, electrical equipment and pumps — all of which have broad preference in many separate and specific industries. Fairbanks-Morse pumps are driven by Fairbanks-Morse motors . . . Fairbanks-Morse raw materials are weighed through manufacture by Fairbanks-Morse scales . . . a continuing close interrelationship between research, design, manufacture and use that results in products that are designed and built from your standpoint . . . that assures your good judgment in buying from Fairbanks, Morse & Co., Chicago 5, Ill.



Diesel Locomotives: For yard, switcher, transfer, suburban, freight and high-speed passenger service.

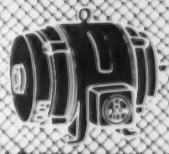
Diesel Engines: For all stationary and marine service including dual fuel applications.

Scales: For every weighing operation: including truck scales, railroad track scales, dial, beam, belt conveyor, counting, and Printomatic scales.



Pumps: Vertical, deep well, centrifugal and rotary pumps of all sizes, also specialized pumps for the widest range of applications.

Home Equipment: Lighting plants, home water systems, water softeners, mowers, etc.



Electric Motors: Complete range of size and types to assure unbiased recommendation, correct motor application.

MORSE

H REMEMBERING

THESE ARE YOUR FAIRBANKS-MORSE SALES CENTERS

ATLANTA 3, GEORGIA
760 Lee St., S. W.
Amhurst 7701

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Belmont 5258

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36546

BOSTON 10, MASS.
178 Atlantic Avenue
LA3-3600

BUFFALO 3, N. Y.
33 Franklin St.
Lin. 4210

CHARLOTTE 2, N. C.
Liberty Life Bldg.
Room 605
62893

CHICAGO 5, ILLINOIS
1550 S. State St.
HA 7-7100

CINCINNATI 2, OHIO
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Main 3010

CLEVELAND 14, OHIO
3000 W. 117th St.
Clearwater 1-3300

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1034 Goodale Blvd.
Walnut 8581

DALLAS 2, TEXAS
1713 N. Market Street
Central 4347

DENVER 2, COLO.
1500 17th Street
Tabor 6241

DES MOINES 17, IOWA
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DETROIT 13, MICHIGAN
11110 East Warren Ave.
Valley 1-7100

DULUTH 2, MINN.
Board of Trade Bldg.

HOUSTON 13, TEXAS
5521 Navigation Blvd.
Wayside 2159—(LD 506)

INDIANAPOLIS 2, IND.
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Franklin 3684

JACKSONVILLE 6, FLA.
930 East Adams St.
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KANSAS CITY 7, MO.
1300 Liberty Street
Victor 6474

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4535 S. Soto Street
Jefferson 8151

LOUISVILLE 8, KY.
2008 So. Brook St.
Kalhoun 1469

MEMPHIS 7, TENN.
676 Jefferson Ave.
51614

MILWAUKEE 3, WIS.
404 N. Plankinton
Daly 8-0180

MINNEAPOLIS 15, MINN.
417 S. Fourth Street
Main 4353

NEW ORLEANS 13, LA.
1000 St. Charles Ave.
Raymond 3115

NEW YORK 4, N. Y.
80 Broad St.
Hanover 2-7470

OMAHA 8, NEBRASKA
902 Harney St.
Atlantic 3122

PHILADELPHIA 8, PA.
401 N. Broad St.
Wal. 2-4100

PITTSBURGH 24, PA.
4301 Main Street
Schenley 1-3123

PORTLAND 14, OREGON
105 S. E. Taylor St.
East 0131

PROVIDENCE 3, R. I.
187 Pine Street

ST. LOUIS 2, MO.
217 South Eighth St.
Chestnut 7483

ST. PAUL 1, MINN.
220-26 E. Fifth Street
Garfield 4335

SALT LAKE CITY 1, UTAH
153 W. Second South St.
32108

SAN FRANCISCO 7, CALIF.
630 Third Street
Exbrook 25855

SEATTLE 99, WASH.
Salmon Bay Terminal
Alden 6600

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TULSA 3, OKLA.
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38231

WASHINGTON 5, D. C.
1000 Vermont Ave., N. W.
District 6694

FAIRBANKS-MORSE de MEXICO S. A.
Balderas 146, Mexico 1, D. F. Mexico
10-06 74

Export Division:
NEW YORK 4, N. Y.
80 Broad Street — Han 2-7470

Take a tip from the people who run Railroads

YOU can date a renaissance in railroad equipment from the time when the first stainless steel streamliners appeared in the 1930's. In stainless steel, railroad management found a material that introduced a whole new set of values . . . so strong that it permits lightweight construction which saves large amounts in fuel costs . . . so corrosion-resistant and everlasting that cleaning, maintenance and depreciation costs are cut to the bone.

The public is benefitted with faster, safer, more comfortable and modern travel accommodations; the roads benefit because stainless steel saves on expenses and increases profits. Today you'll find Allegheny Metal used not only for entire trains, but in dining-car kitchens, sleeping-car equipment, refrigerator cars, and tank cars for the transportation of milk, chemicals, etc.

Rail equipment is only one of the vital uses for stainless steel in general industry and the national defense. In the past decade, we have spent many millions to increase the supply of Allegheny Metal and other alloy products, and are in the process of spending millions more. ● In the national interest, let us help you to use stainless steel most efficiently, and make the available supply go farther.

* * * * *

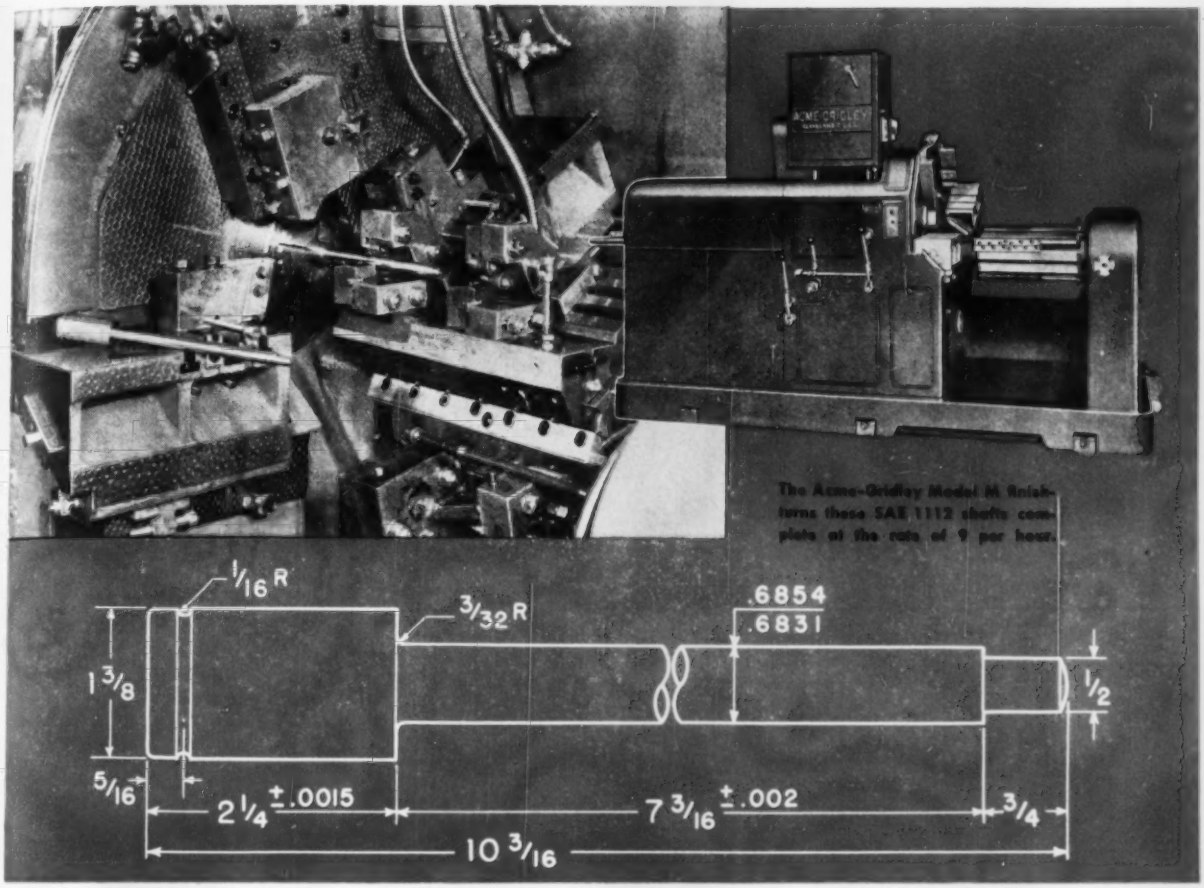
Complete technical and fabricating data—engineering help, too—are yours for the asking from Allegheny Ludlum Steel Corporation, Pittsburgh, Pa. . . . the nation's leading producer of stainless steel in all forms. Branch Offices are located in principal cities, coast to coast, and Warehouse Stocks of Allegheny Stainless Steel are carried by all Joseph T. Ryerson & Son, Inc. plants.

W&D 3149

You can make it **BETTER** with

Allegheny Metal

AL
TIME-TESTED STAINLESS STEEL



The Acme-Gridley Model M finishturns these SAE 1112 shafts complete at the rate of 9 per hour.

THREE TIMES FASTER

—with fine finish and close tolerances

ALL ON AN ACME-GRIDLEY MODEL M AUTOMATIC

Turning long diameters to close tolerances can be tricky—but the new Acme-Gridley Single Spindle Model M Automatic takes exacting jobs like this in stride.

Its wide, open tooling zone and rugged frame are ideal for the special tooling such work requires. In the case-study illustrated, for example, there's plenty of room for the special independent accelerated drive used to get fine finish, and for the roller supports that help preserve close tolerance. Frame strength adequate for high-speed or carbide tools contributes to production records like this three-times-faster performance of nine shafts per hour.

There are other production-increasing advantages, too: eight independently operated tool slides and three ranges of automatic spindle speeds permit the use of the best speeds and feeds for each cut.

Ask for production estimates on your jobs.

Acme-Gridley Model M Automatics are built in three capacities: 3½", 4½" and 5½". For complete information ask for Bulletin M-50.

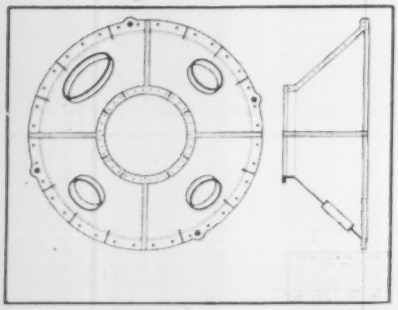
Machine obsolescence is the creeping paralysis that strangles profits.

The NATIONAL ACME CO.

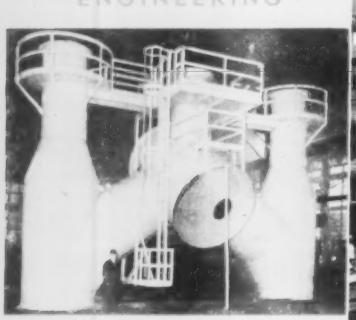
170 EAST 131st STREET • CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle • Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps • The Chronolog-Limit, Motor Starter and Control Station Switches • Solenoids Centrifuges • Contract Manufacturing

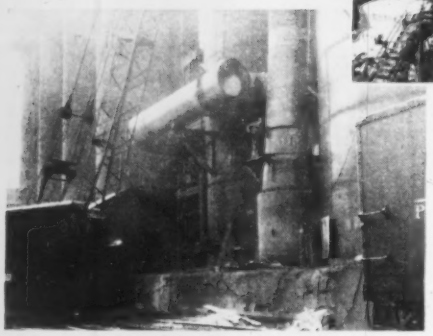
POLLOCK



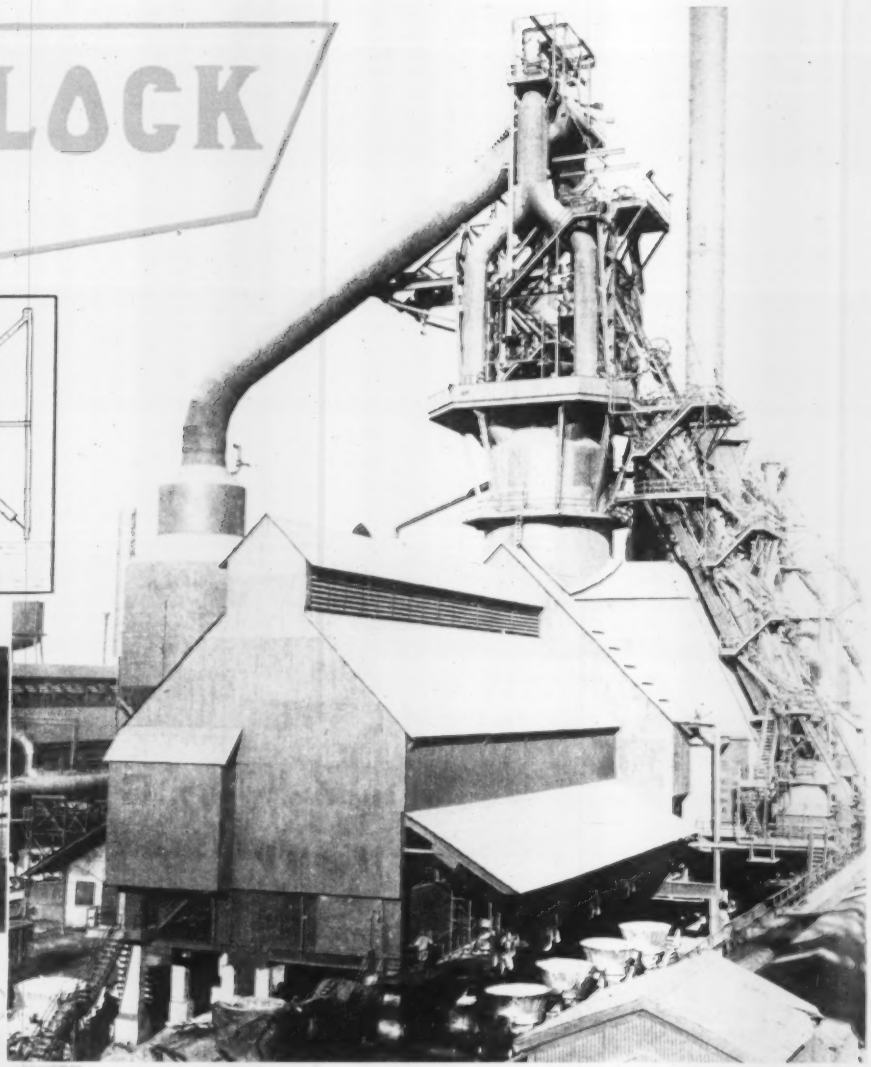
ENGINEERING



SHOP FABRICATION



FIELD ERECTION



Correlating the skills of Pollock engineering, fabrication and field erection to specific operational requirements of The Youngstown Sheet & Tube Company are evidenced in this blast furnace. In addition to furnishing the steel work for this blast furnace, Pollock designed and built auxiliary equipment, including the hot metal ladle cars and cinder cars shown in the above picture. The experience which the Pollock Company has gathered in over eighty-five years is available to you in planning your new projects.

Blast furnace STEEL WORK

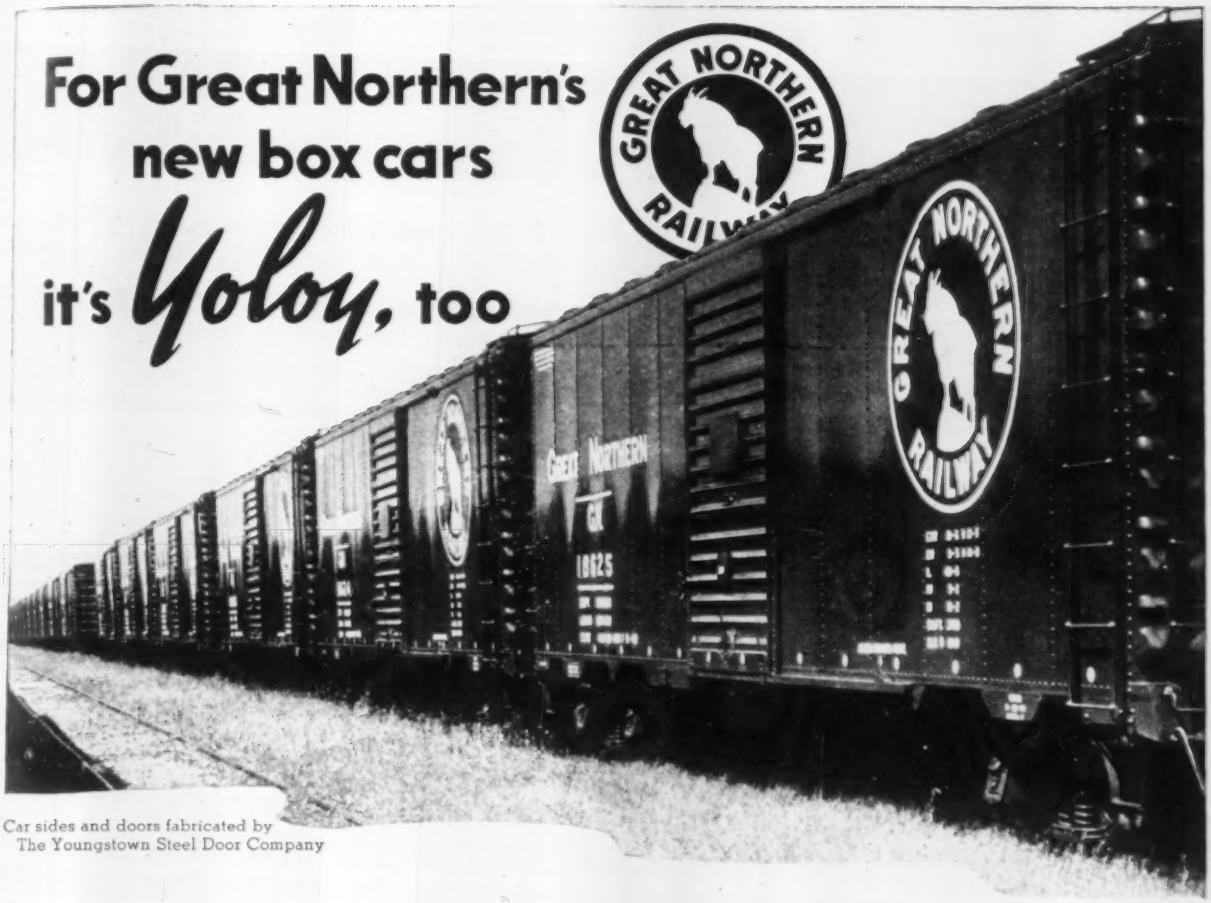
POLLOCK

THE WILLIAM B. POLLOCK COMPANY
YOUNGSTOWN · OHIO

STEEL PLATE CONSTRUCTION · ENGINEERS · FABRICATORS · ERECTORS

BLAST FURNACES · HOT METAL CARS AND LADLES · CINDER AND SLAG CARS · INGOT MOULD CARS · CHARGING BOX CARS · WELDED OPEN HEARTH LADLES

For Great Northern's new box cars it's *Yoloy*, too



Car sides and doors fabricated by
The Youngstown Steel Door Company

THREE thousand new box cars, built by the Great Northern Railway since the war, using Yoloy Steel.

Use of this high tensile steel brings three major improvements: (1) Dead weight of rolling stock is reduced; (2) fabrication of Yoloy is easy; (3) car life is lengthened and maintenance lowered.

Yoloy is Youngstown's high strength, low alloy, nickel-copper steel. Because of its extreme toughness and extra strength, Yoloy can be used in thinner sheets and lighter structural members than usual, without loss of over-all strength. This results in lighter weight construction which not only reduces the cost of dead weight hauls, but permits increased payloads as well.

Yoloy also has unusual ability to resist corrosion, and is highly resistant to abrasion and shock at sub-zero temperatures. It welds and forms easily. It has proved its all-round value as a weight-saving, long-life construction material in rail transportation for more than 15 years.

QUALITY YOUNGSTOWN SERVICE

Youngstown
YOLOY STEEL

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

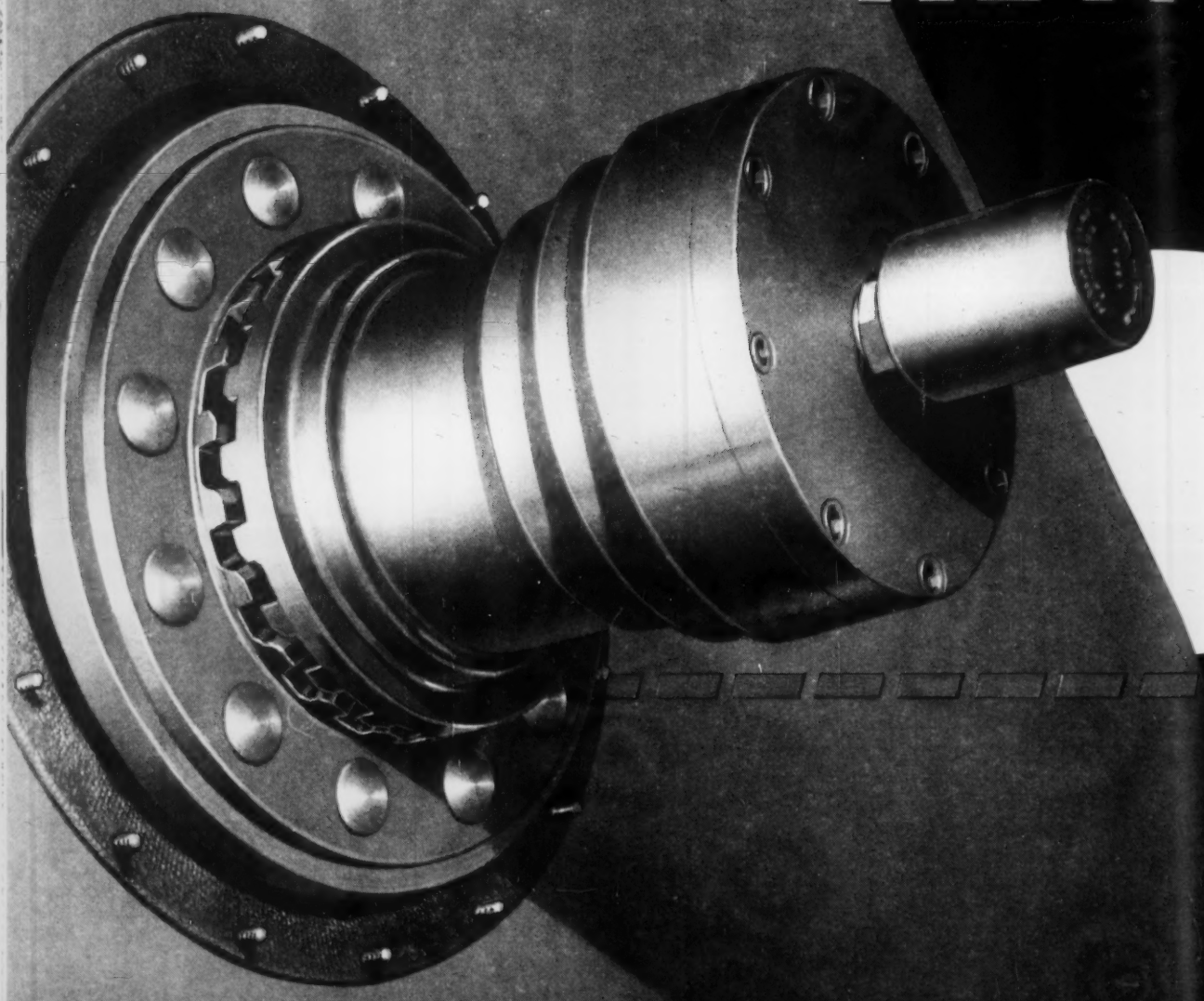
General Offices — Youngstown 1, Ohio

Export Office-500 Fifth Avenue, New York

SHEETS - PLATES - WIRE - ELECTROLYTIC TIN PLATE - COKE TIN PLATE - RAILROAD TRACK SPIKES - CONDUIT - PIPE AND TUBULAR PRODUCTS - BARS - RODS - COLD FINISHED CARBON AND ALLOY BARS.

NIAGARA

NEW



This most revolutionary improvement in press design since Niagara introduced the world famous sleeve clutch in 1934 has been in the process of development and testing for many years. It is patented and there are patents pending.

Its high hourly output . . . its sturdiness . . . its simplicity . . . its labor saving and maintenance economies . . . its safety features . . . are amazing.

PRESENTS

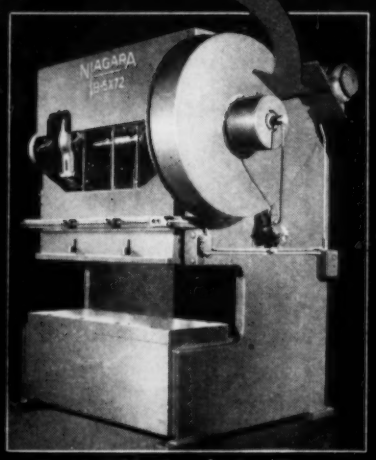
SLEEVE CLUTCH

electrically controlled air actuated

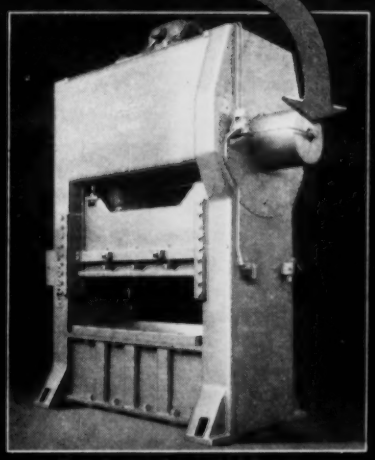
DeLuxe Control

Note each one of these outstanding features:

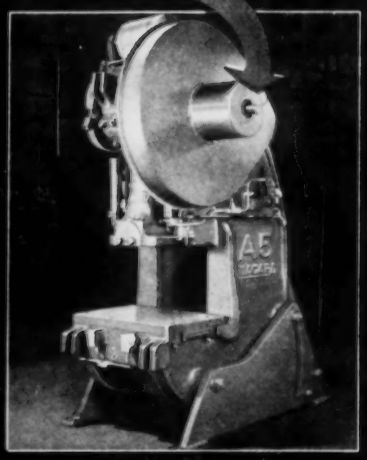
1 Has all the advantages of a friction clutch.
2 Has all the advantages of a Sleeve Clutch.
3 Can be engaged or disengaged at any point in the stroke.
4 Can be jogged through the full 360° of crankshaft travel.
5 Can be stopped instantly, regardless of position of crank, by stop button, electric eye, limit switch or high frequency electric field.
6 Can be operated by palm buttons, foot switch or push buttons.
7 Can be operated single stroke or continuous.
8 Provides positive drive.
9 Has no friction members to wear.
10 Generates no heat.
11 Has low air consumption.
12 Makes instant engagement.
13 Provides effortless operation.
14 Is located on outside of drive wheel.
15 Can be completely removed without taking off the drive wheel.
16 Drive wheel next to frame . . . minimum overhang.
17 Drive wheel runs on antifriction bearings.
18 Gears and clutch run in a bath of oil.
19 Has few moving parts. Integral jaws and splines.
20 Presses so equipped are provided with air releasing brake.



For Double Crank Gap Presses



For Straight Sided Presses



For Inclinable Presses

NIAGARA MACHINE AND TOOL WORKS, BUFFALO 11, NEW YORK

DISTRICT OFFICES: DETROIT, CLEVELAND, NEW YORK

6 OPERATIONS ELIMINATED

with the use of *Carpenter* Stainless Tubing

This job is exceptional, but it shows what *can* happen to unit costs when you make use of Carpenter's experience with Stainless Tubing.

Unit costs were way out of line and rejects were piling up on the floor when this water cooler part was made from sheet. Seven operations were required on each part. Silver soldering of finished units was practically impossible because the fabricated material would not satisfactorily withstand high temperatures.

Now, water cooler parts are fabricated in one reverse bending operation from Type 304 Carpenter Stainless Tubing. Six operations, ranging from the slitting of sheet to the annealing of fabricated parts, have been eliminated and the soldering of assemblies is a snap.

Analysis, Tolerance and Finish are guaranteed on every shipment of Carpenter Stainless Tubing. To find ways to save time and eliminate problems on your jobs, put our Stainless Tubing experience to work.

In making sanitary parts for water coolers, Carpenter Stainless Tubing is used to provide the durability that reduces servicing costs.

THE CARPENTER STEEL COMPANY
Alloy Tube Division, Union, N. J.
Export Department: The Carpenter Steel Company, Reading, Pa. "CARSTEELCO".

Carpenter
STAINLESS TUBING

USE THIS FOLDER OF DATA ABOUT STAINLESS TUBING

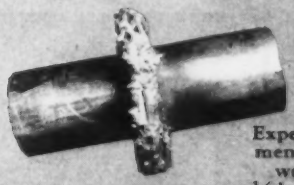
For useful information about physical properties, heat resistance characteristics, standard sizes, etc., write on your company letterhead and ask for the 12-page Carpenter Stainless Tubing Data File Folder.

Analysis · Tolerance · Finish

—guaranteed on every shipment

TITANIUM WELDING

Top to bottom: parent metal; weld zone after welding; weld zone after heating 10 minutes at 1650°F. and furnace cooling; and weld zone after heat treatment for 20 minutes at 1650-1700°F. and furnace cooling.



Experimental weld on ½-inch round rod.

Federal Welders of Standard Design Used With Exceptional Success...

Commercially pure titanium is being flash butt welded in production quantities by the American Welding & Mfg. Co., using a standard 750 kva Federal Welder.

Titanium rings for jet aircraft engines are formed from 1x1¼-inch bar stock, then welded, using a burnoff of about ¾-inch and an upset of ¾-inch in a typical 15-second cycle.

While experimenting with welding ½-inch round rods of titanium, American Welding found the standard Federal Welder rapidly produced a weld that held under a breakdown tensile of 115,000 psi, the fracture occurring in the parent metal. All ½" test welds were proof loaded at 22,000 pds or 105,000 psi with no failures.

Many such reports of the extreme flexibility and rugged construction of hundreds of Federal Welders working in the first line of defense is the reason why today, more than ever before — *FEDERAL IS FIRST IN RESISTANCE WELDING.*

Federal® WELDERS

Warco® PRESSES

THE FEDERAL MACHINE AND WELDER COMPANY

WARREN, OHIO

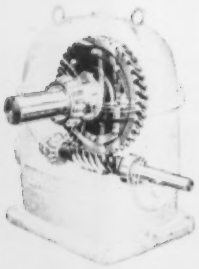
Speed reduction problem?

Is it Ratio? Space? Shock? Overload?

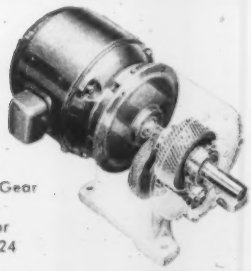
No *one* speed reducer solves *every* reduction problem. That's Why LINK-BELT Builds All THREE.

FOR the *right* speed reducer engineered to match your exact conditions, your best bet is Link-Belt. Link-Belt builds all three—Helical, Herringbone and Worm gear drives. When a Link-Belt power transmission engineer analyzes your problem, he isn't tempted to fit his recommendation to a limited line.

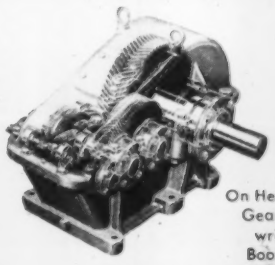
You can also be sure that the Link-Belt unit recommended is engineered and built for tough operating conditions. And efficiency in power transmission is matched by flexibility in application!



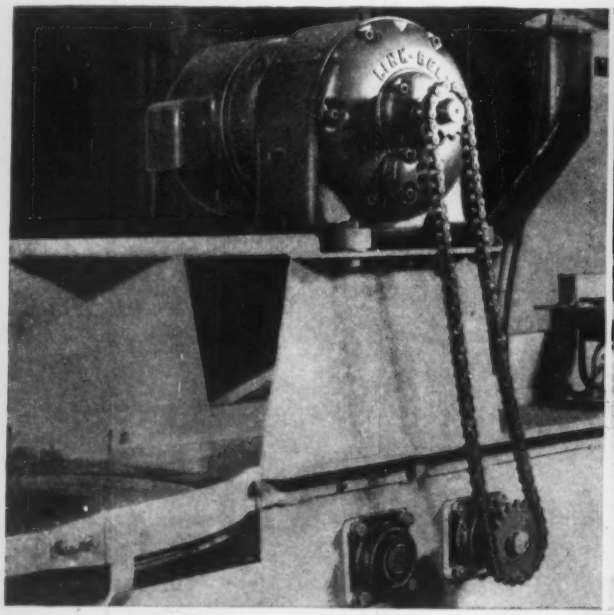
On Worm Gear Drives write for Book 2324



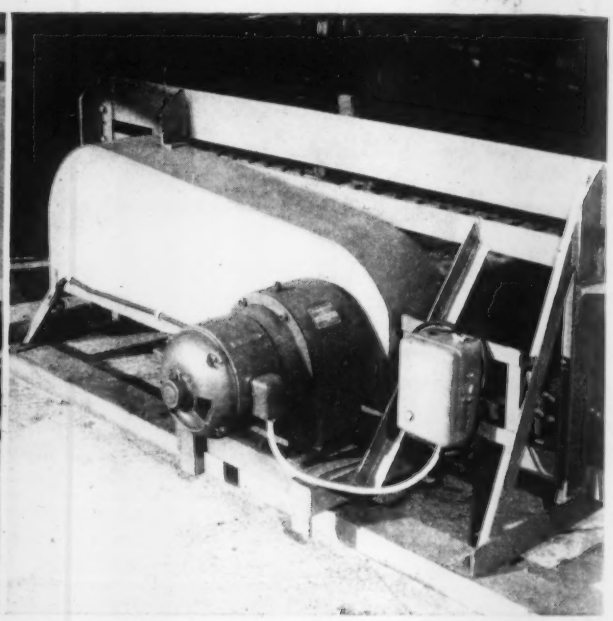
On Helical Gear Drives write for Book 2247



On Herringbone Gear Drives write for Book 2419



Link-Belt 1 hp Gearmotor, conveniently mounted, operates a revolving plate disc used in manufacturing tin cans. Note also Link-Belt Roller Chain and Roller Bearing Flanged Block.



Conveyor section of a railroad tie doweling machine driven by a compact Link-Belt 2 hp Gearmotor through an enclosed Link-Belt Precision Steel Roller Chain Drive.

LINK-BELT

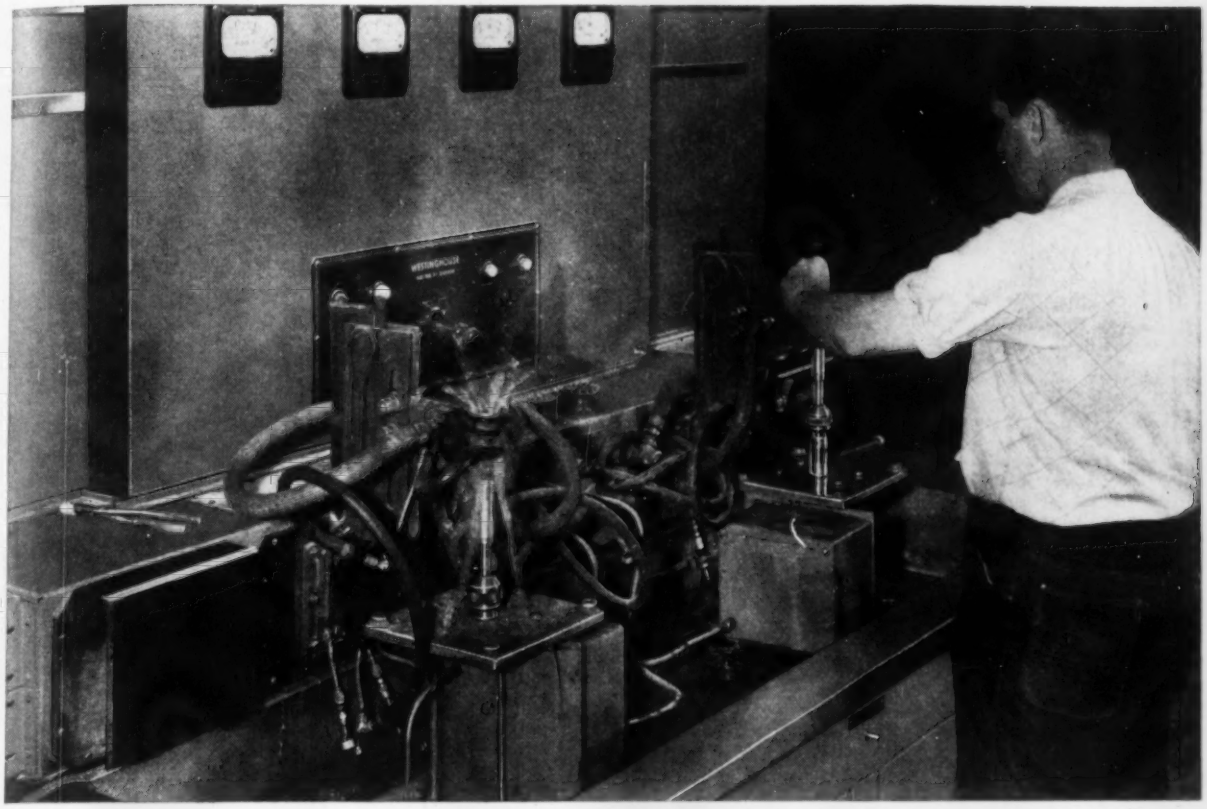
ENCLOSED GEAR DRIVES

12,242-A

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.

YOU CAN BE **SURE**... IF IT'S

Westinghouse



NOTHING TALKS TOUGHER...

PRODUCTION UP 226%; COSTS DOWN 60%!

Could you use production increases of 226% with direct costs lowered 60% in your quantity hardening? That's the mean average for five typical parts as reported by The Massey-Harris Company, Racine, Wisconsin, farm equipment manufacturers. Now sixty different parts, formerly carburized, are hardened by two Westinghouse 50 KW-450 KC RF generators with standard Westinghouse rotating-lifting spindles.

Such results are usual with Westinghouse RF equipment, and—added savings are realized with in-line production techniques, negligible ready time, production increases without plant expansion, and elimination of descaling, straightening and other operations.

Such flexibility and productivity pay high dividends. Examine Westinghouse RF heating possibilities NOW—they may solve your heat treating problems.

We'll be glad to help you increase *your* quantity hardening production and decrease *your* costs. Our engineering representatives will gladly consult with your staff (without obligation, of course); their experience has aided many manufacturers. Write today. Address: Westinghouse Electric Corporation, Department S-1, 2519 Wilkens Ave., Baltimore 3, Maryland.

J-02228

Westinghouse

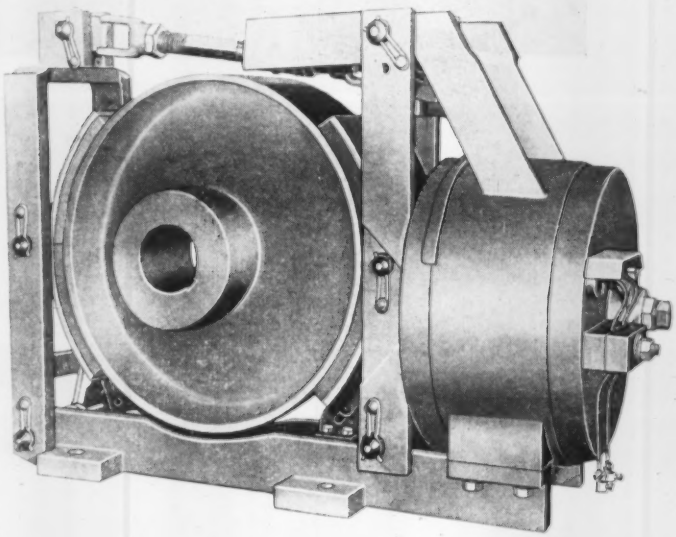
RF HEATING

It's time to repeat that

CLARK

BULLETIN 106 D.C. SHOE BRAKES

are

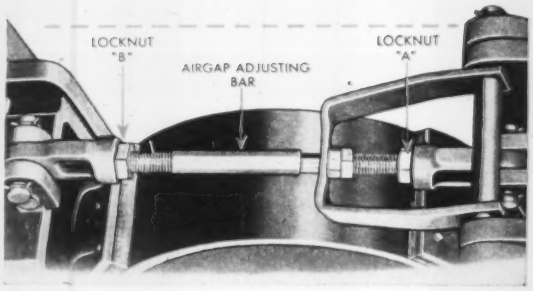


1. The only brakes with one adjustment for lining wear. And that adjustment is on the top—not on the bottom—not on the sides—not on the ends—but on TOP, where you can see it and get at it easily.
2. The only brakes designed to fit the new 600 SERIES Type Mill Motors.
3. Operated like a nut cracker—a basic principle in mechanics—resulting in equal distribution of forces, and dependable operation.
4. The simplest to adjust.
5. Very easy to install.

--and here's where

the only adjustment needed—and that's for lining wear—is made. Right on top.

Simply loosen locknuts A and B and turn the adjusting bar until the gauge nut sleeve is again flush with the gauge rivet. With this adjustment made, the brake is returned to its original setting, automatically providing correct shoe clearance, air gap and torque setting.



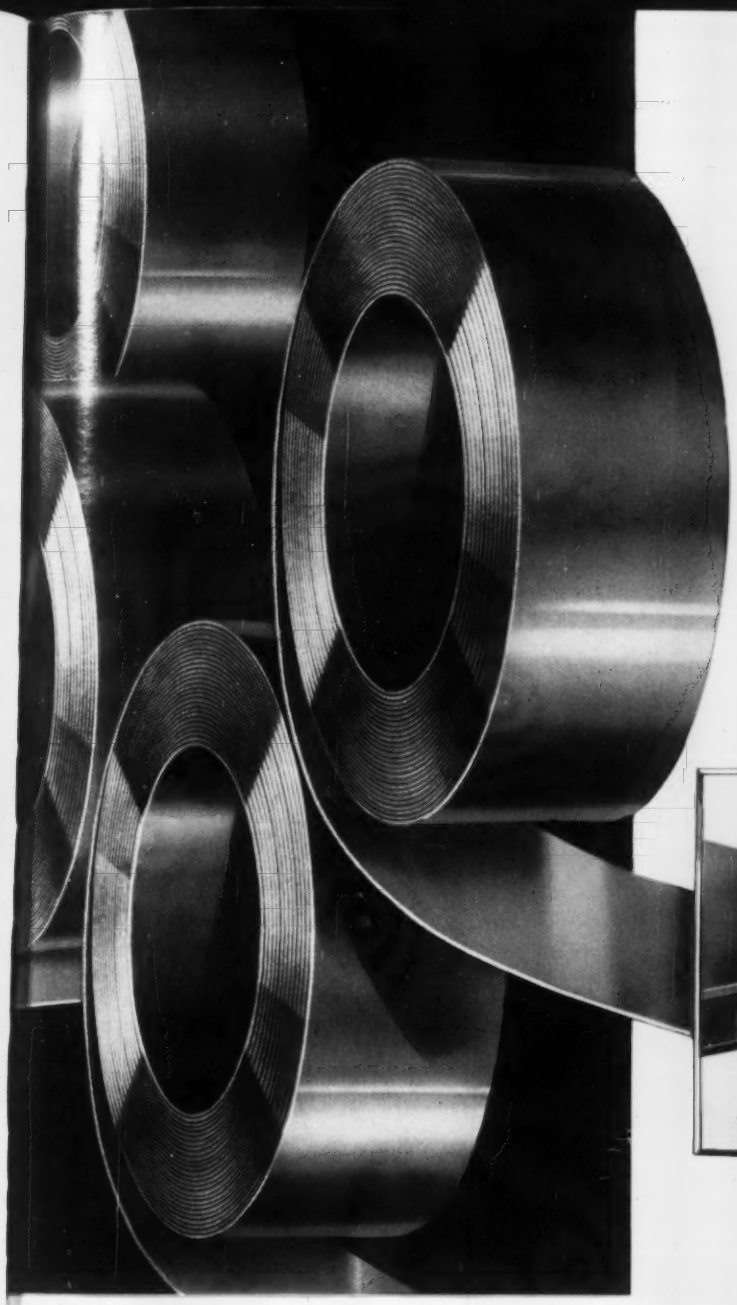
Over twenty-five hundred CLARK Bulletin 106 D. C. Brakes were built during the war—hundreds more are in service on Mill installations such as Cranes, Charging Machines, Side Guards, Screwdowns, Transfer Cars, etc. and reports of outstanding performances are being received.

The nearest CLARK representative will gladly consult with you on your Brake problems.

EVERYTHING UNDER CONTROL

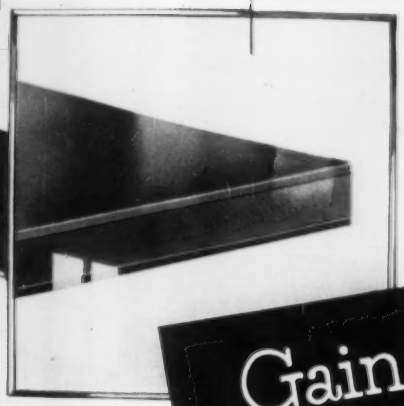
THE CLARK CONTROLLER CO.

1146 EAST 152nd STREET, CLEVELAND 10, OHIO



where copper's face value counts

and steel's strength and economy are needed . . .



Gain both

with

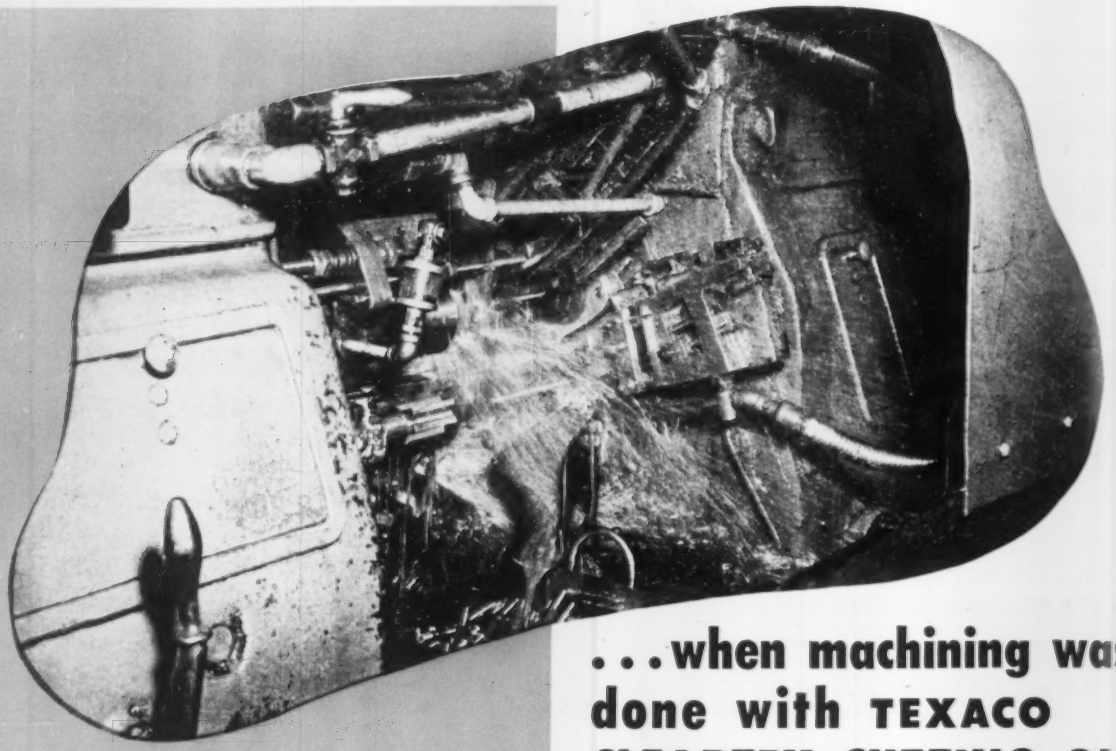
SuVeneer®

COPPER CLAD METAL

SuVeneer Clad Metal gives you copper bonded inseparably to plain steel strip, on one or both sides . . . providing the advantages of all-copper surfaces, while saving solid copper for defense needs. Your costs are lower with SuVeneer Clad Metal, wherever it can take the place of solid copper . . . and your product performance is increased with the added strength of steel!

Write to our Sales Department for fuller information on SuVeneer Clad Metal, and any assistance you may desire in developing projected applications. No obligation of any kind.

Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA



130% GREATER PRODUCTION between tool grinds...

...when machining was done with TEXACO CLEARTEX CUTTING OIL

In this plant,* steel parts for pumps were being machined on Acme Gridley automatics. Two different competitive oils were being used — one as cutting fluid and the other as machine lubricant. Production lagged because of frequent tool changes, and contamination of coolant by machine oil necessitated frequent oil changes.

Then a Texaco Lubrication Engineer was asked what could be done to speed up production. He recommended using *Texaco Cleartex Cutting Oil B* as both coolant and machine lubricant. One oil thus replaced two; contamination problems and oil wastage were eliminated — and *production between tool grinds immediately jumped 130%!*

Machining stainless steel on the same set-up, use of *Texaco Cleartex Cutting Oil B* increased production between tool grinds 42%.

Let a Texaco Lubrication Engineer specializing in metal working help you gain increased production and lower unit costs in *your* plant. There is a complete line of Texaco Cutting, Grinding and Soluble Oils to help you do every machining job better, faster and at lower cost.

Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Name of this Texaco user on request

TEXACO

TEXACO CUTTING, GRINDING AND SOLUBLE OILS FOR FASTER MACHINING

TUNE IN . . . TEXACO presents MILTON BERLE on television every Tuesday night. METROPOLITAN OPERA radio broadcasts every Saturday afternoon.

HARSHAW supplies industry with

Electroplating Salts
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Preformed Catalysts
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and Metal Soaps

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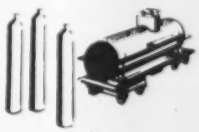
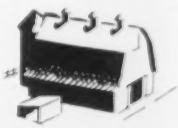
Chemicals



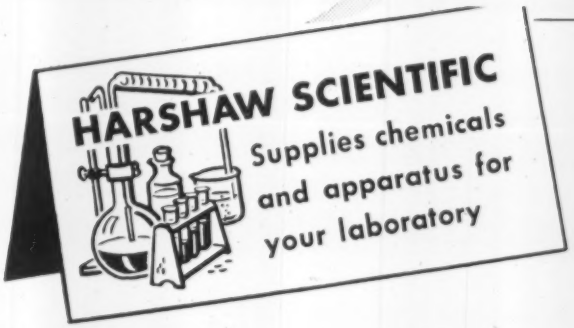
Fluorides

Chemical
Commodities

Glycerine



Fungicides



HARSHAW

THE HARSHAW CHEMICAL CO. Cleveland 6, Ohio

Cleveland • Chicago • Cincinnati • Detroit • Houston • Los Angeles • New York • Philadelphia • Pittsburgh

HARSHAW SCIENTIFIC • Division of The Harshaw Chemical Co. Cleveland 6, Ohio

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Here's Chromium-Nickel Stainless You Can Heat-Treat to C50!

Armco 17-7 PH is an *unusual* chromium-nickel stainless steel that offers many opportunities in aircraft structural parts and other defense equipment.

Unlike regular chromium-nickel grades, 17-7 PH can be *heat-treated at low temperature to high strength and hardness.* For example, when sheet or strip is supplied "Hard Temper" from the mill, you can heat-treat Armco 17-7 PH at 900 F to a hardness as high as Rockwell C50-52.

This also develops yield strength of 250,000 psi and tensile strength up to 255,000 psi. Elastic properties are *higher* than any heretofore obtainable in such a wide range of gages in stainless steels. (See table for values in various conditions.)

If you require sheet and strip that must be drawn or formed, 17-7 PH is also supplied in workable "Soft Temper." Two heat treatments (1400 + 950 F) bring Rockwell Hardness to C40-45 and yield strengths up to 190,000 psi.

In Wire Too

Armco 17-7 PH Wire is a new precipitation-hardening stainless steel of special interest to spring manufacturers. After forming mill-supplied "Hard Temper" wire, you can develop full strength and elastic properties by a single 850-900 F heat treatment. It develops Rockwell hardness of C48 and up; tensile and yield strengths of 310-345,000 psi in diameters of .030" to .041".

If you use stainless steel bars, you'll be interested in a companion precipitation-hardening grade—Armco 17-4 PH. It is ideal for large springs, gears, cams, pinions, chains; valve plugs, seats and stems; shafting, precision instrument parts, and special nuts, bolts and fasteners.

Finish-Machine First

Armco 17-4 PH bars and forgings *may be finish-machined* and then heat-treated at 850-900 F to obtain the desired hardness up to Rockwell C45.

Corrosion resistance of the Armco "PH" grades approaches that of 18-8 stainless steel.

If your products need high strength and hardness, with excellent corrosion resistance, write for complete details on these newest Armco special-purpose stainless steels.

CHECK THESE TYPICAL PROPERTIES

Mechanical Property	Armco 17-7 PH Sheet, Strip and Plate				Armco 17-4 PH Bars (Typical for 1" Bar)	
	Soft Temper (As Supplied)	Soft Temper (Fabricator-Treated 1400 + 950 F)	Hard Temper (As Supplied)	Hard Temper (Fabricator-Treated at 900 F)	Annealed	Hardened 900 F
Ult. Tensile Strength, psi	115-150,000	185-210,000	215,000	255,000	150,000	195,000
0.2% Yield Strength, psi	35-50,000	150-190,000	190,000	250,000	110,000	180,000
Elongation in 2", %	20-40	7-12	3	3	—	—
Rockwell Hardness	B78-92	C40-45	C44	C50	C32	C43

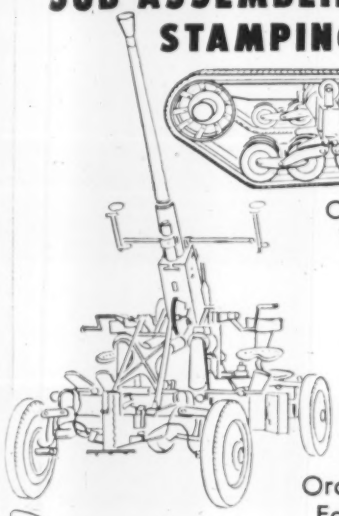
ARMCO STEEL CORPORATION

2371 Curtis Street, Middletown, Ohio • Plants and Sales Offices from Coast to Coast • Export: The Armco International Corporation

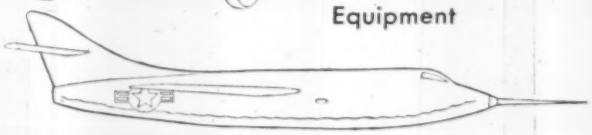
GEARED FOR DEFENSE PRODUCTION

SUB ASSEMBLIES AND STAMPINGS FOR

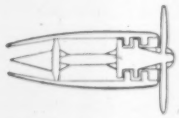
Ordnance Vehicles



Ordnance Equipment



Aircraft



Aircraft Accessories

★ Stainless Steel, Carbon Steel, Aluminum

Fast, Efficient, Integrated Facilities at Two Modern Firestone Steel Fabricating Plants Assure On-Time Deliveries of Defense Contracts

HERE'S help on your defense contracts *NOW* when you need it most. Firestone's two modernized metal fabricating plants — at Wyandotte, Michigan and Akron, Ohio — are built for speed. Fast, latest type automatic presses, and new processing, finishing and assembling lines guarantee *on-time* deliveries of those difficult sub-assemblies and large size stampings now so vital for our military needs.

Firestone plants are geared for defense. No matter how many operations your job requires, it never leaves the plant until it's loaded on the truck. Firestone is your sole supplier — solely responsible for getting the job to you the *way* you want it, *when* you want it. For quick action, wire or phone Firestone Steel Products, Metal Stampings Division, Akron 1, Ohio. Or if you prefer, send drawings and blueprints for immediate estimate.

Firestone STEEL PRODUCTS CO.

AKRON, OHIO . . WYANDOTTE, MICH.

Listen to the Voice of Firestone on radio or television every Monday evening over NBC

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The New NPA Regulation No. 4

and Ryerson Steel Service

Any business—large or small—may now use a DO rating to obtain limited quantities of steel for maintenance, repairs and minor capital additions. The rating to apply is DO-97 as authorized by the NPA's new Regulation No. 4.

Obviously the use of this rating does not automatically get the steel because it is impossible to maintain complete stocks under present conditions. However, it does assure your order of preference over unrated orders and equal treatment with all other orders bearing a priority rating. If we have the steel you get it. Moreover, we can in turn extend the rating which should help us to maintain stocks for your future needs.

Because of broken stocks, we suggest you give us alternate sizes, gauges and qualities that would be acceptable. In this way you increase the chances of getting steel you will be able to use.

And remember, if your order falls within the provisions of Regulation No. 4 take advantage of it—use your rating! You can be sure that we will make every effort to take care of you as promptly and fully as possible.

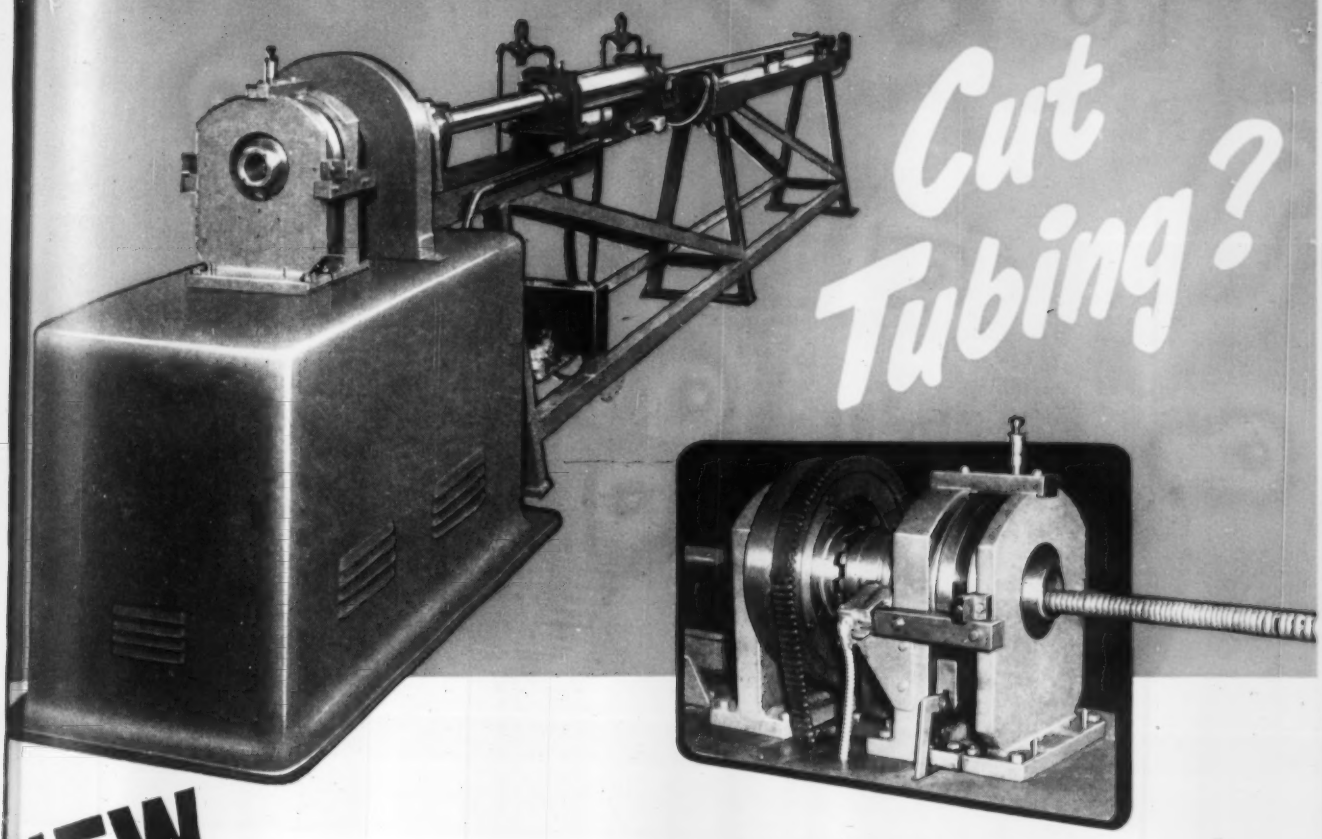
If you do not have this Regulation No. 4 we will be glad to send you a copy.

PARTIAL LIST OF PRODUCTS—BARS • STRUCTURALS • PLATES
SHEETS • TUBING—IN CARBON, ALLOY & STAINLESS QUALITIES

RYERSON STEEL

STEEL-SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • DETROIT • CINCINNATI • CLEVELAND
PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO

Looking for a Better Way to Cut Tubing?



NEW DUNCAN-McKAY TUBE CUTOFF IS YOUR ANSWER . . .

CHECK THESE OUTSTANDING FEATURES

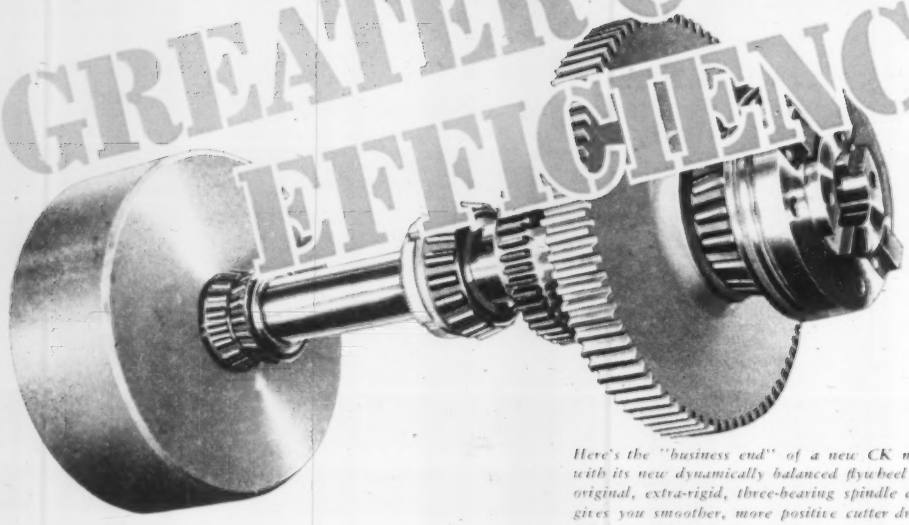
√ SIMPLICITY OF DESIGN	With economy in mind.
√ SIMPLICITY OF SET UP	Ordinary shop personnel entirely competent after brief instruction.
√ SIMPLICITY OF OPERATION	Fully automatic—fool-proof.
√ SPEED OF OPERATION	Rates as high as 60 cuts-per-minute, depending on length of cut tube.
√ NO LOSS OF METAL	Tube wall is sheared—no metal removed.
√ QUALITY OF CUT	Practically burr free.
√ TUBE STATIONARY DURING CUT	Eliminating chances of marking.
√ CONCENTRICITY OF TUBE	Original concentricity maintained.
√ LENGTH TOLERANCE	Positive stops control travel of feed cylinder—close length tolerances easily maintained.
√ TOOLING	Simple, concentric dies—easily produced in your own tool room.
√ LOW MAINTENANCE	Early models have been in continuous operation—over 2,000,000 cuts with only occasional die grinding required.

McKAY MACHINE Company
YOUNGSTOWN, OHIO

McK

ENGINEERS AND DESIGNERS OF EQUIPMENT FOR THE AUTOMOTIVE, FABRICATING AND STEEL INDUSTRIES

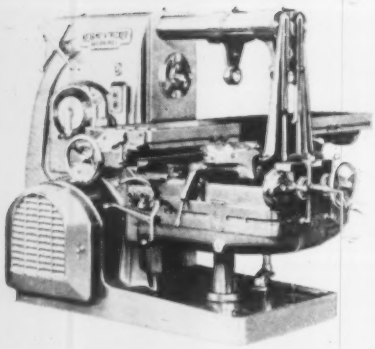
GREATER CUTTING EFFICIENCY



Here's the "business end" of a new CK milling machine — the spindle — with its new dynamically balanced flywheel and Kearney & Trecker's famous, original, extra-rigid, three-bearing spindle design. Added flywheel momentum gives you smoother, more positive cutter drive — the key to Greater Cutting Efficiency using modern cutting tools. And you get increased cutter life, too. The three-bearing spindle design affords ample support and greater rigidity. The heavy duty wide-faced spindle drive gears of forged steel are specially processed for longer life and exceptionally smooth, quiet operation.

A new line of knee-type milling machines

KEARNEY & TRECKER MILWAUKEE **CK's**



New Model CK
25 hp No. 5 Plain Style
Milling Machine

YES, Kearney & Trecker's new CK milling machines are packed with design and operating features that make them *more productive, more profitable for you.*

Spindle-mounted flywheel, broad feed and speed ranges and greater horsepower with separate motor drives for spindle, and feed and rapid traverse, mean you get fullest possible benefit from modern cutting tools.

New CK columns give you greater rigidity. Compared to former columns, they give you 1000 pounds more metal in heavier ribbing, in box-type, sponson construction to absorb vibration from heaviest cutting loads.

For greater production, these machines are equipped with Kearney & Trecker's famous Mono-Level Control that shortens floor-to-floor time, and materially reduces operator fatigue. New, non-glare micrometer dials help avoid costly errors in reading . . . give you a positive lock at every setting.

Automatic flood lubrication in column and knee and positive metered lubrication to table and saddle, plus generously proportioned gears and shafts assure you greater machine life.

Find out for yourself about Kearney & Trecker's new CK line of knee type milling machines . . . how they meet every demand of modern milling practice . . . how they can give you greater production at greater profit.

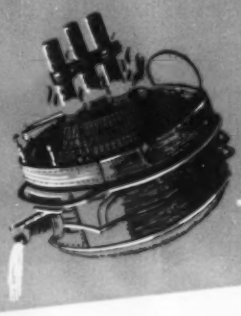
Sizes are No. 2, 3, 4, 5, and 6 . . . Plain and Universal styles. For complete details, contact your nearest representative or write direct. Kearney & Trecker Corp., 6784 W. National Ave., Milwaukee 14, Wisconsin.

REPLACEMENT OF OBSOLETE MACHINE TOOLS
IS AN INVESTMENT THAT MAKES BOTH DOLLARS AND SENSE

KEARNEY & TRECKER MILWAUKEE MACHINE TOOLS

THE SYMBOL OF QUALITY... IN

ELECTRIC FURNACE STEELS



ARISTOLOY STEELS

STANDARD STRUCTURAL ALLOY • BEARING QUALITY • ALLOY TOOL • SPECIALTY • NITRALLOY • CARBON TOOL • MAGNAFLUX-AIRCRAFT QUALITY

Hot Rolled • Forged • Annealed • Heat Treated
Normalized • Straightened • Cold Drawn
Machine Turned • Centerless Ground

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Houston 3, Texas

528 Fisher Building
Detroit, Michigan

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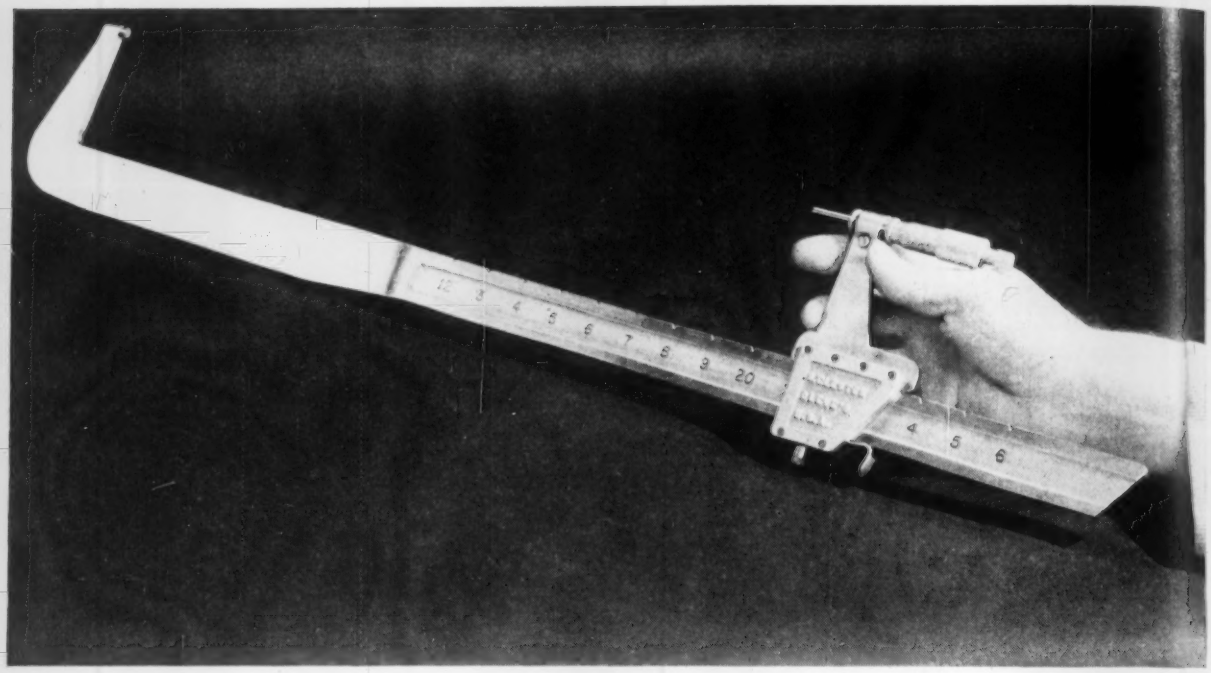
Seattle, Washington

Monadnock Building
San Francisco 5, California

IT'S BETTER TO USE THE BEST!

How GRAPH-MO steel made a micrometer measure up



PRECISION'S the thing at the Lester Micrometer Company, Cleveland, Ohio, and a good example of it is their V-notch Adjustable Micrometer. The extreme accuracy of this instrument depends on the precise spacing of the V-notches. And the micrometer spacer must maintain a certain accuracy between the anvils. Finding a steel that would permit and maintain this precision posed a problem. The right steel for this job would have to: 1. retain its initial accuracy over a long period of years, 2. give minimum distortion from heat treating, 3. machine easily and 4. assure excellent welded characteristics for strength.

After experimenting with other steels, the engineers found the answer in Graph-Mo steel. Graph-Mo did not change size in aging, did not warp or crack during heat treating, machined easily and allowed ductile welds that did not develop cracks under shock loading.

Because Graph-Mo contains free graphite, it machines fast and easily to close tolerances. It hardens uniformly with minimum distortion and gives an extremely fine finish after polishing. And due to diamond-hard carbides in the structure, it offers unusually stubborn resistance to wear and abrasion.

Graph-Mo is one of four Timken graphitic tool steels widely used in gauges, dies, machine parts and other applications. For further information, write for the enlarged 9th edition of the Timken Graphitic Steel Data Book. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

TIMKEN

TRADE-MARK REG. U.S. PAT. OFF.

Fine Alloy

STEEL

and Seamless Tubes

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.

American Offers FELTS TO ARMED FORCES SPECIFICATIONS

If you have Defense Order Contracts, or subcontracts calling for the use of wool felt, get in touch with American. We can supply you with the felt to meet your specifications.

When writing, please use these felt specification numbers on your contracts.

This information is important, since in recent years there have been changes in Federal specifications for wool felts. American knows and will gladly work closely with you to see that Defense Orders for felt are filled with material that meets the requirements exactly.

Note These Two Specifications

Here are the two most important specifications for wool felt.

Specification No.	Title
Air Force Contracts	
MIL-F-5656 (Supersedes AN-F-14a) (Identical with S.A.E. Felt Specifications)	Felt Wool
All Other Contracts	
Federal Specification C-F-206 (Identical with S.A.E. Felt Specifications)	Felt Mechanical Roll

American Felt Company

TRADE MARK

GENERAL OFFICES: 60 GLENVILLE ROAD, GLENVILLE, CONN.

ENGINEERING AND RESEARCH LABORATORIES: Glenville, Conn.—PLANTS: Glenville, Conn.; Franklin, Mass.; Newburgh, N. Y.; Detroit, Mich.; Westerly, R. I.—SALES OFFICES: New York, Boston, Chicago, Detroit, Cleveland, Rochester, Philadelphia, St. Louis, Atlanta, Dallas, San Francisco, Los Angeles, Portland, Seattle, Montreal.

JEBCO
PRODUCTS
MAKERS OF BAKER'S MAGDOLITE

"ONE always stands out"

and among refractory dolomites it's . . .

BAKER'S MAGDOLITE

The acceptance of Magdolite among leading users of refractory dolomites throughout the country is the result of years of dependable service.

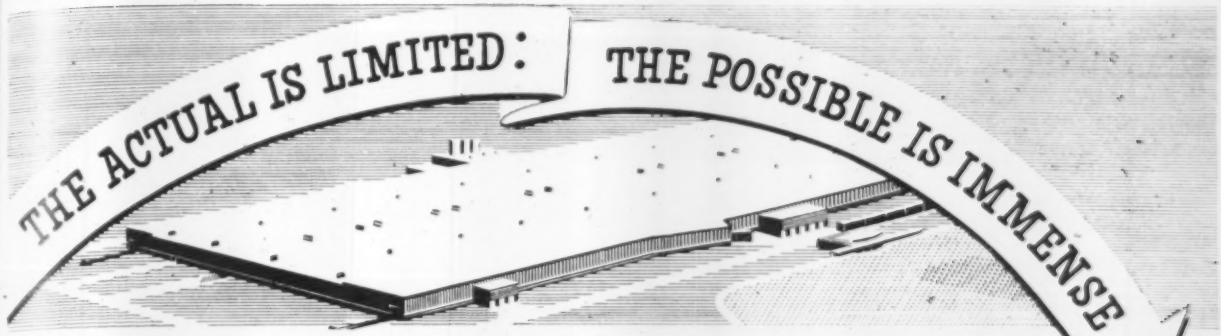
Magdolite's superior chemical, physical and mineralogical composition, coupled with Baker's continued research and development in the application of refractories, assure you of a minimum of maintenance and repairs.

When you buy . . . specify Baker's Magdolite . . . the logical choice in refractory dolomites.

ALWAYS 5 WAYS BETTER — Composition • Preparation • Economy • Strength • Quality

THE J. E. BAKER COMPANY • YORK • PENNSYLVANIA

PLANTS: Billmeyer, Pennsylvania • Millersville, Ohio



NEW LINCOLN PLANT CREATED BY INCENTIVE-INSPIRED CO-ACTION IN DEVELOPING POSSIBILITIES IN PRODUCT

© LE Co. 1951

DESIGNS THAT UTILIZE THE ECONOMIES OF WELDED STEEL ARE ALWAYS LOWER IN COST

1 There is a 2 to 1 advantage pound per pound between the cost of steel and iron.

2 Considering both strength and safety factors, there is an additional 4 to 1 advantage with steel.

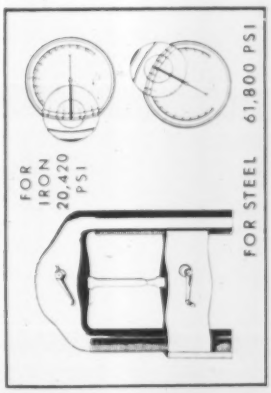
3 The design advantages are unlimited. Through origineering,* the designer is better able to locate the stronger materials in strategic areas, achieving maximum load-carrying capacity per pound of metal.

4 Production efficiency is greater. The shop can fabricate economically in any quantity . . . with a minimum of equipment and setup cost.

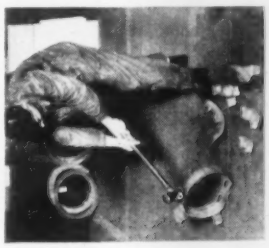
A Challenge to Industry

The greater potential economies possible with welded steel originate with design. To utilize the full benefits of steel requires new concepts in mechanics and appearance. Your Lincoln Welding Engineer can show you how to achieve these benefits in your designs . . . to build better products from less material at lower cost. Write The Lincoln Electric Co., Cleveland 1, Ohio.

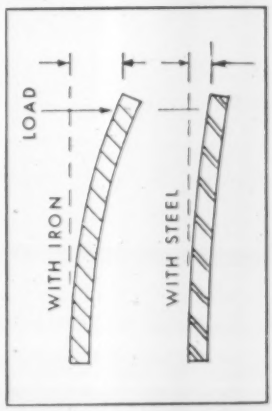
*Origineering . . . the science of originating new engineering designs.



Steel is 3 Times Stronger. *Has 4 times the resistance to fatigue.*

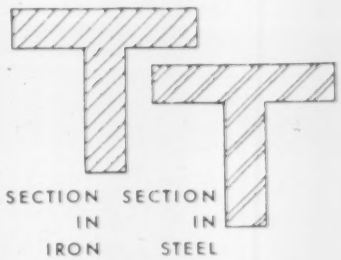


Steel is Ductile. *Withstands impact and shock without fracturing.*



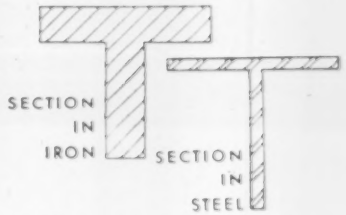
Steel is Twice as Stiff. *Only half the material is needed in welded steel designs to achieve equal rigidity.*

the ACTUAL



Saves 50% Material Cost *by duplicating cross section in steel.*

increasing the YIELD



Needs 60% Less Metal *to achieve equal strength in bending.*

the IMMENSITY of the POSSIBLE

An initial 7 to 1 cost advantage with welded steel

SEE HOW WELDED STEEL CUTS COSTS

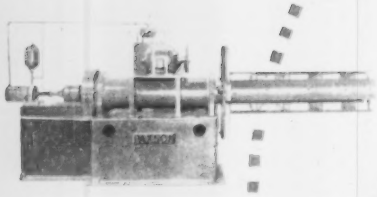
Machine Design Sheets are available to designers and engineers. Simply write on your letterhead to Dept. 64

THE LINCOLN ELECTRIC COMPANY

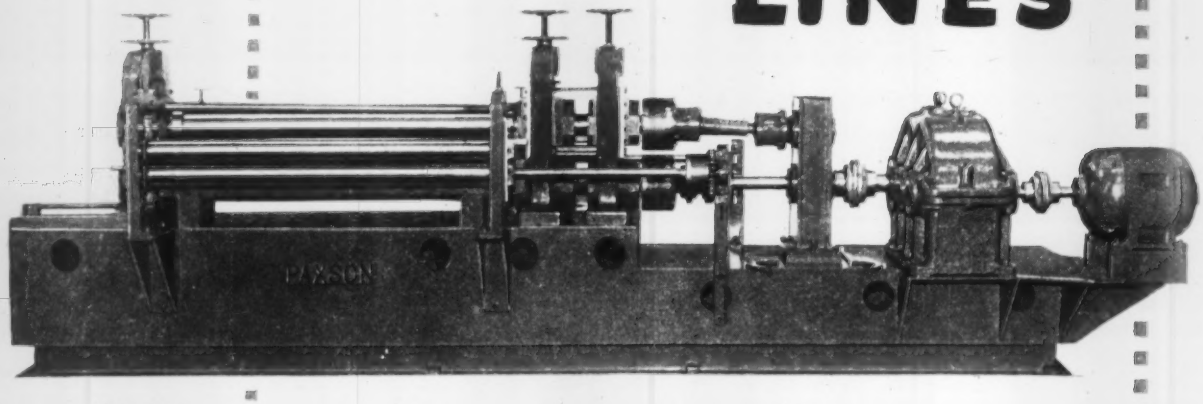
CLEVELAND 1, OHIO

PAXSON GIVES YOU THE EDGE

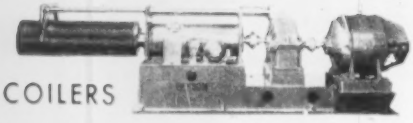
HEAVY-DUTY *Slitting* LINES



PAY-OFF REELS



SLITTERS



COILERS

STRAIGHTENERS
SCRAP WINDERS
SCRAP CHOPPERS

Do You Fly?

2800 ft. E.W. runway and club house, private field 2 miles west of Salem, maintained for your convenience. Wire or phone arrival time. We will meet your plane.

Complete PAXSON lines are setting performance records—*coast to coast*

Paxson Slitters are proving their efficiency for the toughest jobs, such as cutting heavy wall tubing stock and other heavy-duty slitting. Capacities up to 30,000 lb. coils. Various power, to meet requirements up to 1½" total metal thickness. Paxson also builds general duty lines.

Whatever your slitting requirements—contact Paxson.

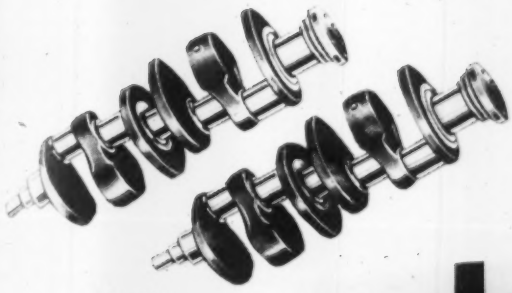
PAXSON MACHINE CO.

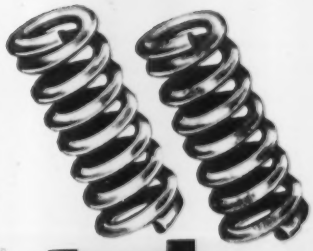
SALEM • OHIO

Engineers and Builders of Cold-Rolled Strip-Mill Equipment

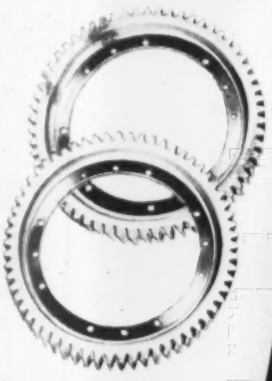
SPECIALIZING IN SLITTING LINES

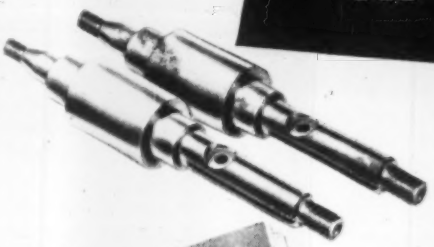
REMEMBER, ALL PAXSON LINES ARE CUSTOM BUILT





do you have RUST in your plants?





STOP RUST WITHOUT OIL OR GREASE

Have you heard about the new way of packaging parts and machines without the use of oil or grease-type rust preventive coatings? Do you know that now you can receive parts from your suppliers that are "factory-fresh"—sparkling clean—free of rust or grease—ready for immediate assembly or use? Send for this important book of case histories which shows you how others have eliminated the slushing and degreasing problem—how you can apply this new method in your own operations. No obligation. No cost. It's from Nox-Rust—Headquarters for Rust Preventive Products.

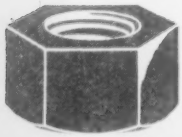
Do your beautifully machined parts and machines reach your customers pitted or stained? Then you've a *RUST* problem, a needless cost! Better call in a Nox-Rust representative. He's a specialist in rust prevention. He will show you how to properly protect metals (1) between operations, (2) in storage, (3) during shipment, domestic or export.

Are you bidding on government orders which require a rust preventive coating? Then, by all means see the Nox-Rust representative. He will give you complete information regarding the coatings required. What's more, he will snow you how to apply them. Nox-Rust specializes in the production of Federal Specification coatings and oils.

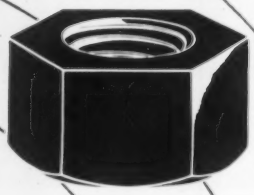
SEND FOR FOLDER LISTING FEDERAL RUST PREVENTIVE SPECIFICATIONS AND NOX-RUST PRODUCTS CONFORMING TO EACH.

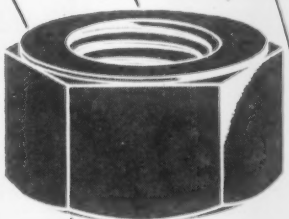
NOX-RUST CHEMICAL CORPORATION

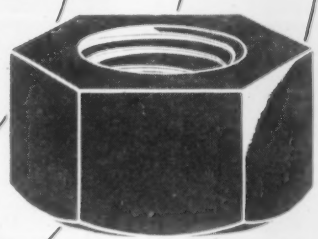
Rust Prevention Division
2481 South Halsted Street
Chicago 8, Illinois
BALTIMORE PHILADELPHIA
DETROIT SAN FRANCISCO

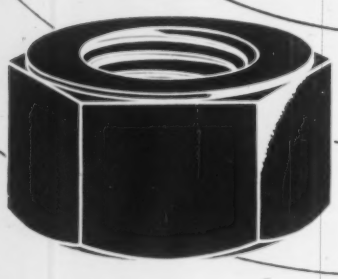


RIGHT EVERY WAY FOR WRENCHING!









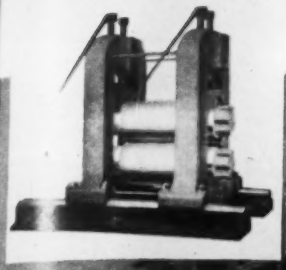
Republic UPSON

SEMI-FINISHED AND COLD PUNCHED NUTS

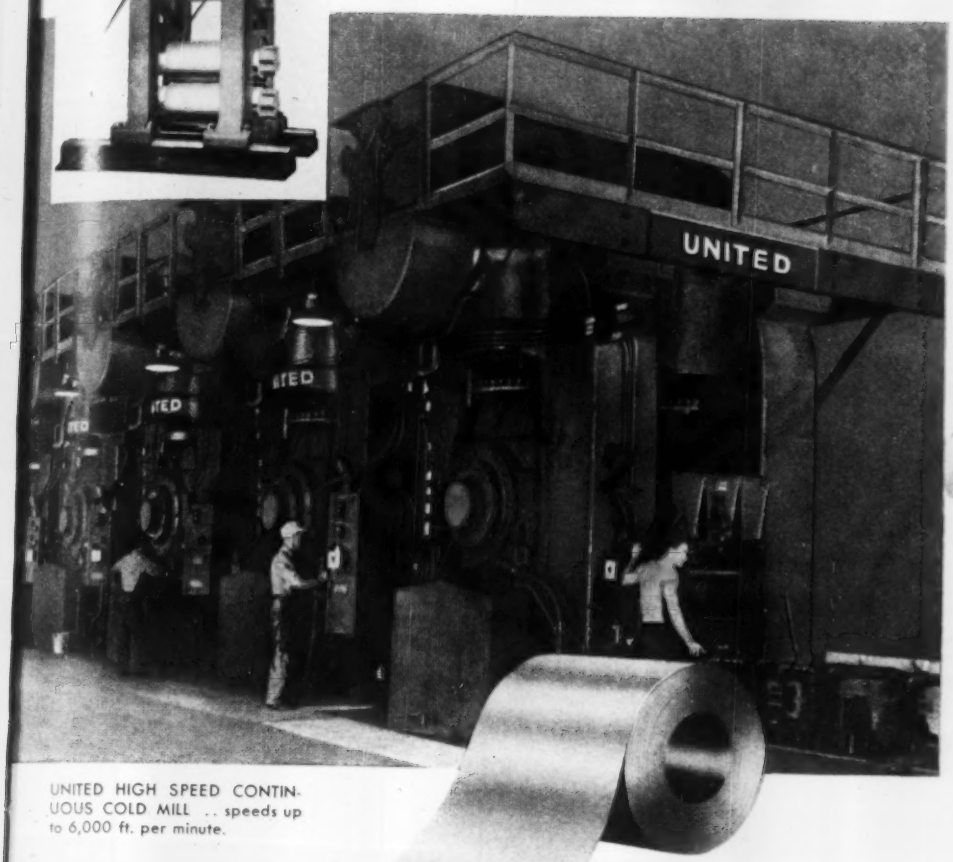
By the box, keg or carload, Republic Upson Nuts and Bolts are consistently and uniformly the same . . . *right for wrenching . . . right for holding.* You can count on Republic Upson Nuts (and bolt heads, too) to be straight-sided, sharp-cornered, right-sized for snug wrench fit . . . threads to be clean, accurate, tough. Supply your needs from this big line of over 20,000 shapes and sizes.

REPUBLIC STEEL CORPORATION
Bolt and Nut Division
CLEVELAND, OHIO • GADSDEN, ALABAMA
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL



EARLY COLD MILL . . . about 1901



UNITED HIGH SPEED CONTINUOUS COLD MILL . . speeds up to 6,000 ft. per minute.

50 YEARS AGO

Mom Did Most of the Canning

BUT not any more. Today, the world's choicest foods, with all their goodness and flavor locked in neat, sanitary tins, reach our pantry shelves in infinite variety and abundance.

The phenomenal growth of the canning industry—America's largest user of tin plate—would not have been possible without the development of new and better steel rolling and coating processes.

In the contributions to better living that United has been able to make through a half century of pioneering in the design and construction of more efficient rolling equipment, it takes great satisfaction.

As always, United's engineers will be glad to work with you on your plans for increased tin plate production.

1901 Golden Anniversary 1951

UNITED

ENGINEERING AND FOUNDRY COMPANY

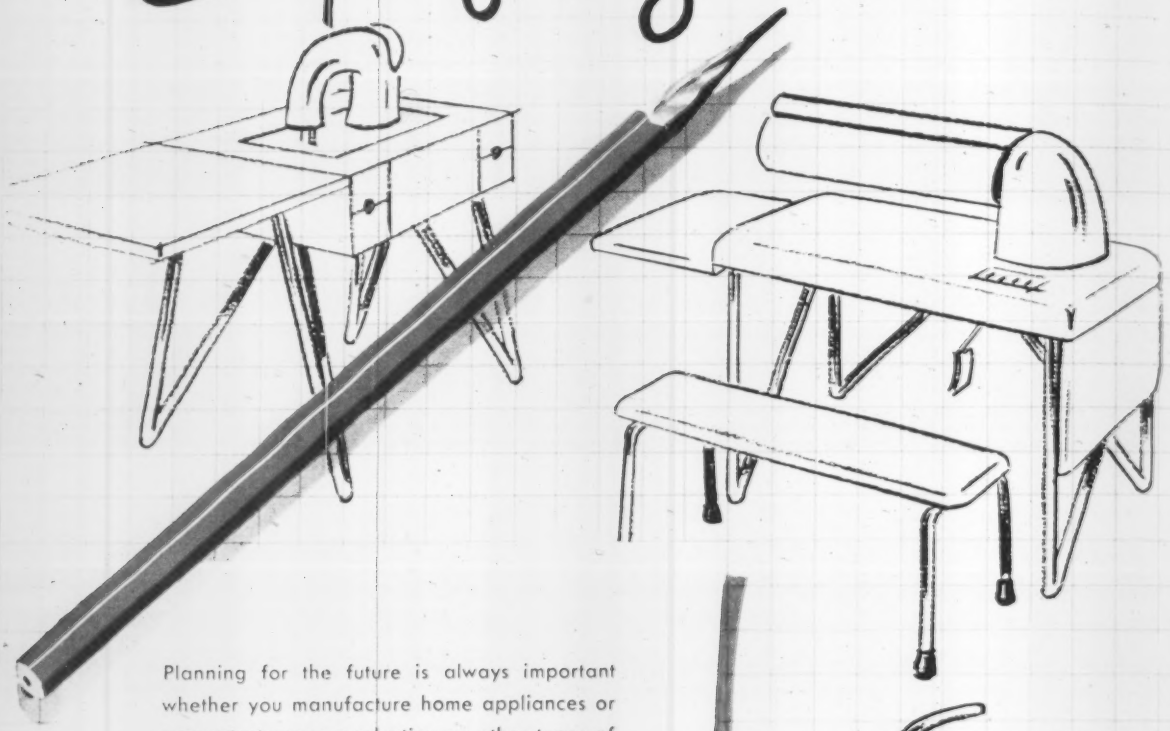
Pittsburgh, Pennsylvania

Plants at PITTSBURGH • VANDERGRIFT • NEW CASTLE • YOUNGSTOWN • CANTON

Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

Subsidiaries: ADAMSON UNITED COMPANY, AKRON, OHIO • LOBDELL UNITED COMPANY, WILMINGTON, DELAWARE • STEDMAN FOUNDRY AND MACHINE CO., INC., AURORA, INDIANA

Shape of things to come...



Planning for the future is always important whether you manufacture home appliances or concentrate your production on other types of consumer goods. Now is the time to consider OSTUCO Steel Tubing because no other material offers so many opportunities to improve design, cut costs, enhance beauty, and add strength while reducing weight. That's why more and more product designers and engineers have turned to OSTUCO.

Because our Armed Forces are placing heavy demands on steel tubing output, we cannot always promise delivery estimates on new civilian orders. But, we do offer our full cooperation to help make your future plans take shape with OSTUCO Tubing. Please feel free to call upon our experienced tubing engineers for advice and information.

From Your Blueprint . . . to Your Product

OSTUCO TUBING

Tapering • Swaging • Flanging • Bending
Upsetting • Expanding • Reducing • Beading
End closing • Spinning • Drilling • Slotting
Notching • Flattening • Shaping • Trimming
Threading • Angle Cutting • And Many Others

THE OHIO SEAMLESS TUBE COMPANY

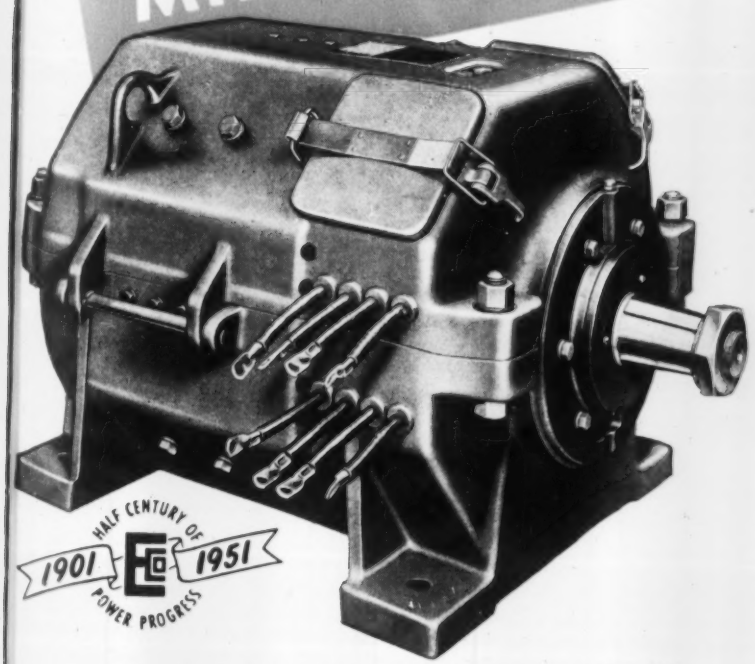
Manufacturers and Fabricators of Seamless and Electric Welded Steel Tubing

Plant and General Offices: SHELBY 4, OHIO

SALES OFFICES: BIRMINGHAM, P. O. Box 2021 • CHICAGO, Civic Opera Bldg., 20 N. Wacker Dr. • CLEVELAND, 1328 Citizens Bldg. • DAYTON, 511 Salem Ave. • DETROIT, 520 W. Eight Mile Road, Ferndale • HOUSTON, 6833 Avenue W, Central Park • LOS ANGELES, Suite 300-170 So. Beverly Drive, Beverly Hills • MOLINE, 617 15th St. • NEW YORK, 70 East 45th St. • PHILADELPHIA, 1613 Packard Bldg., 15th & Chestnut • PITTSBURGH, 1206 Pinewood Drive • ST. LOUIS, 1230 North Main St. • SEATTLE, 3104 Smith Tower • SYRACUSE, 501 Roberts Ave. • TULSA, 733 Kennedy Bldg. • WICHITA, 622 E. Third St. • CANADIAN REPRESENTATIVE: RAILWAY & POWER CORP., LTD

Here's the MILL MOTOR that gives you EXTRA POWER

CROCKER-WHEELER 600 SERIES Direct Current MILL MOTOR



Available for heavy duty mill and crane service in 5 to 265 horsepowers. Also available in the following modified forms—separately forced ventilated — protected self-ventilated — back geared. Bulletin SL620-1A gives details.

■ In developing this great new motor, C-W engineers have achieved a design that conforms to AISE standards, but packs *more power* into each standard size frame—as much as *33% more!*

And like a true champion, the Elliott C-W Mill Motor can take it as well as dish it out. It's more than a match for the heavy overloads, the reversing strains and the punishing continuous duty of the toughest mill service.

When you need a mill motor—whether for replacement or for new drives—it will pay you to get the motor that, size for size, gives you the most power — the Elliott C-W 600 Series.

GET FULL DETAILS IN THIS NEW BULLETIN

It explains the exclusive features that give the C-W 600 Series Mill Motor *extra power* — make it *extra easy to maintain—give it extra long life.* Write for Bulletin SL620-1A— Address, Dept. I, Elliott Company, Jeannette, Pennsylvania.

Crocker-Wheeler AC and DC motors and generators range from 1 to 200 hp or kw. Larger Elliott motors and generators are built by the Ridgway Division in Ridgway, Pa.

CW-21

ELLIOTT COMPANY

GENERAL OFFICES & MAIN PLANT—JEANNETTE, PA.

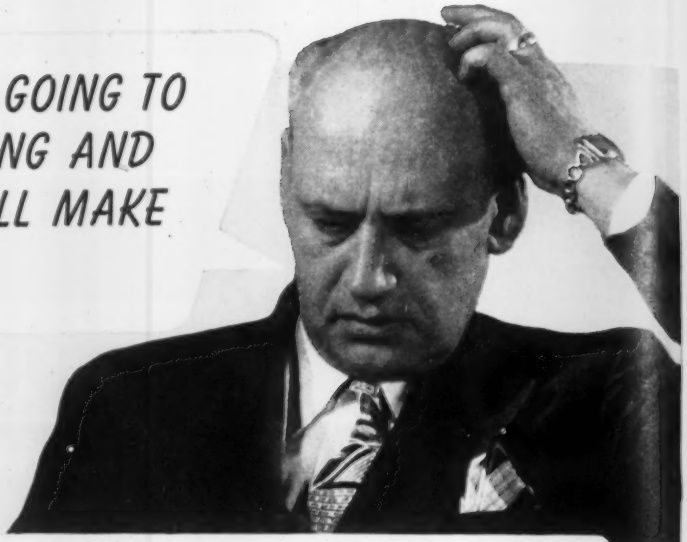
CROCKER-WHEELER DIVISION

Ampere, N. J.

BRANCH OFFICES AND REPRESENTATIVES IN PRINCIPAL CITIES

ELLIOTT *Approved* SERVICE SHOPS COVER THE COUNTRY

JIM, HOW ARE WE GOING TO DO ALL THIS CUTTING AND WELDING... AND STILL MAKE DELIVERY ON TIME?



THAT NEW P&H ELECTRODE IS THE ANSWER, BILL. DH-4, THE FASTEST ROD WE'VE EVER BURNED!

NEW P&H DH-4 Electrode

3 Sizes Available

1/8", 5/32" and 3/16"

Operates off DC welder on straight polarity or AC welder with minimum open circuit voltage of 80 volts.

For high-speed welding — cutting and gouging

...perfect X-Ray welds on heavy metal sections without machining or scarfing

This is the most unusual rod ever developed. It has so many applications that the American Welding Society does not have an AWS number for it.

Because of its wide range of usefulness the new DH-4 rod has shown outstanding economies in welding time and costs.

Here are a few of its many advantages: Fast deposition rate. Easy manipulation. Welds mild steel to mild steel without processing. Has extremely high penetration — 1/4-inch with 1/8-inch rod at 300 amps. Cuts time on horizontal fillet welds, flat butt welds, and vertical down welds. Ideal for gouging and cutting. Gives excellent results on Hadfield manganese and high-carbon steels.

If you want to give your production a lift and reduce your costs, you'll want to know more about the unusual DH-4. See your P&H representative or distributor. Write us for details.

P&H HARNISCHFEGER CORPORATION

WELDING DIVISION
4411 W. National Avenue
Milwaukee 14, Wisconsin

Excavators • Overhead Cranes • Hoists • Arc Welders and Electrodes • Soil Stabilizer
Crawler and Truck Cranes • Diesel Engines • Cane Loaders • Pre-assembled Houses 2256

8 out of 10 Car Builders

Of the ten leading builders of railroad cars in this country, eight have long been users of Murex Electrodes.*

Alert production men in many industries prefer Murex Electrodes because they mean better, faster welding — increased production rates. And, frequently Murex provides the answer to a difficult welding problem.

*All those who have AAAA directory financial ratings

WELD WITH...

MUREX®

METAL & THERMIT CORPORATION 100 EAST 42nd ST., NEW YORK 17, N. Y.

ELECTRODES • ARC WELDERS • ACCESSORIES

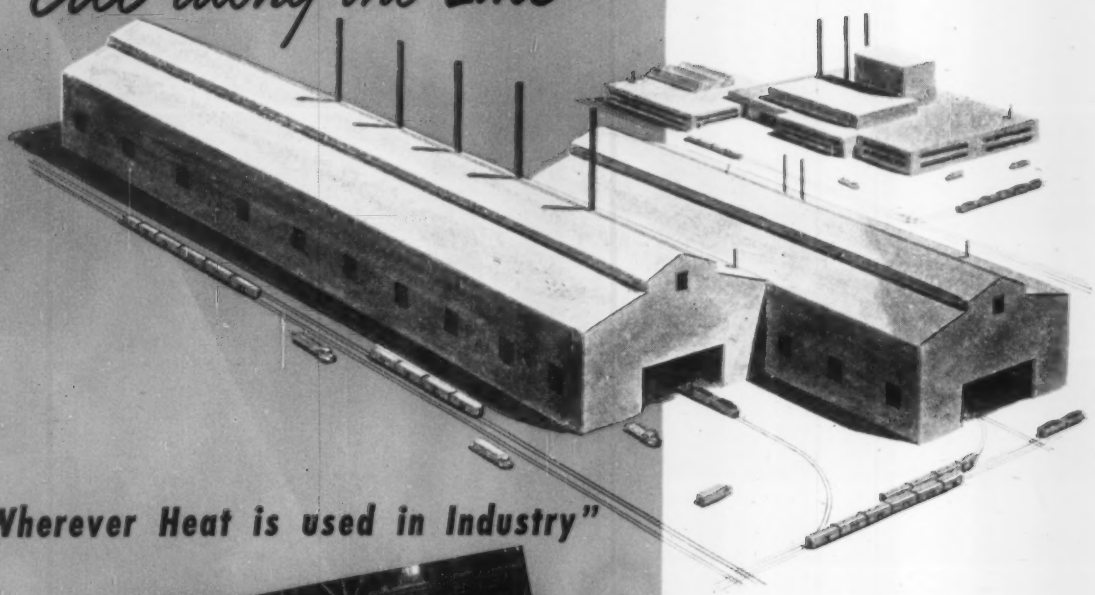
It's

LOFTUS

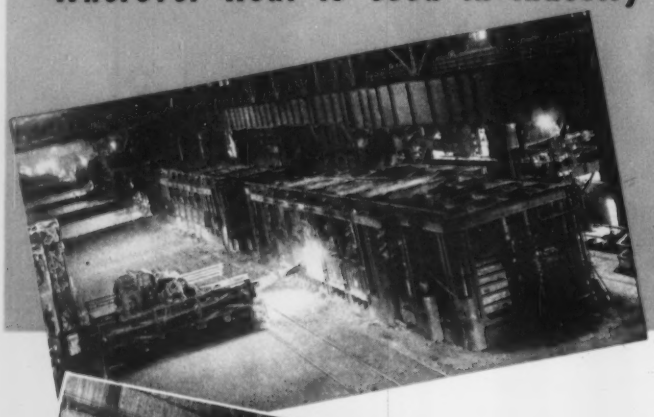
All along the Line

COMPLETE PLANTS

- Open Hearths
- Soaking Pits
- Individual Furnaces



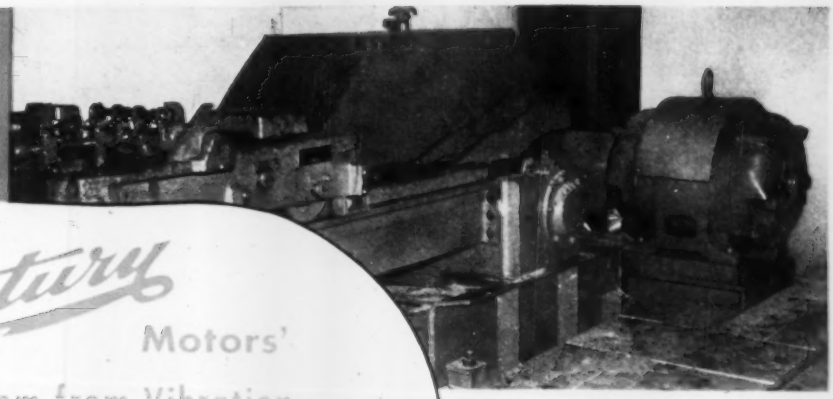
"Wherever Heat is used in Industry"



Whether it is the designing and construction of a Complete Plant, a line of Open Hearths, Soaking Pits, or Individual Furnaces, the Loftus organization one of the largest in the country with *specialists* in all phases of industrial heating, is equipped to handle any commitment with skill and exactness — and with undivided responsibility.

610 SMITHFIELD ST. **LOFTUS ENGINEERING** *Corporation* PITTSBURGH, PA.

Designers and Builders **Engineers, Consultants, Contractors**



Century Motors'

Unusual Freedom from Vibration

Helps Maintain Close Tolerances— With a Minimum of Rejects

Century motors are designed to help you get the accuracy that was built into your modern production machines. They are ruggedly built, carefully machined and well balanced both mechanically and electrically. Century motors are widely known for their unusual freedom from vibration.

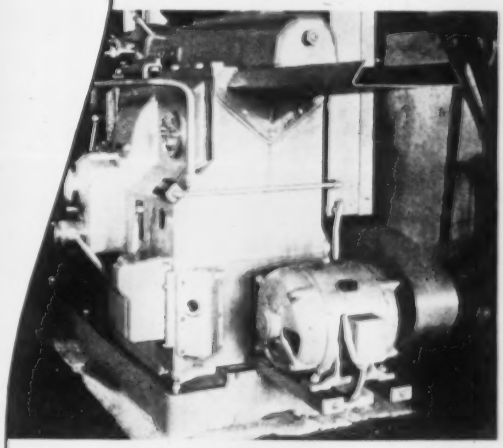
Century motors have wide acceptance from BIG NAME machine tool manufacturers because they mount squarely and solidly and operate with smooth, quiet precision.

You may select Century motors in: open drip proof — splash proof — or totally enclosed fan cooled construction to assure uninterrupted production against various atmospheric hazards.

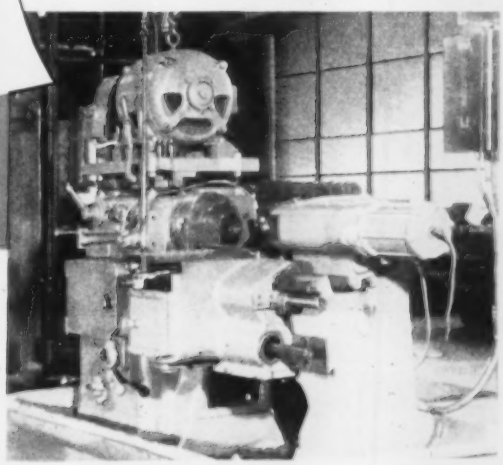
The complete line of Century motors permits selection of the right motor to meet the requirements of your machines. They are built in a wide range of sizes from 1/6 to 400 horsepower. Specify Century for all your equipment.

CENTURY ELECTRIC COMPANY
1806 Pine St., St. Louis 3, Missouri
Offices and Stock Points in Principal Cities

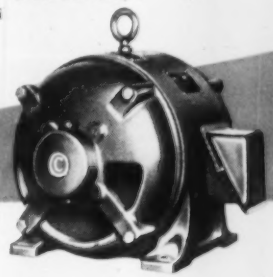
75 Horsepower Century drip proof motor on a copper tube drawing machine.



7½ Horsepower Century drip proof motor on a crank shaper in a tool room.



7½ Horsepower Century drip proof motor on a special production lathe.



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Is Near Any CENTURY Motor Driven Equipment

Satisfactory performance of CENTURY products is assured by more than 200 CENTURY Authorized Service Stations supervised by 28 CENTURY Sales Offices.

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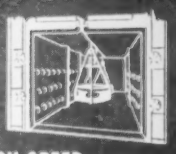
Century MOTORS 700

Century Electric Company is celebrating its 50th Year in the electrical industry

Gradiation

PRECISION TOOL FOR PRODUCTION WAR



HIGH SPEED radiant heat made possible the continuous heat treating of cast armor-plate for tanks with improved metallurgy.

FUNCTION FITTED radiant heat is speeding up forgings by one-third . . . is doubling die life.

DIRECT RADIANT heat has put heat processing of electronic glass tubes on a continuous, precise and automatic basis.

LIQUID HEAT TREATMENT of petroleum and chemicals assures more and better products . . . less space for equipment.

FAST DRYING with radiant heat . . . continuous strip of roofing felt, paper, textiles . . . paints . . . coatings . . . even instantaneous ink drying at paper speeds of 1000 fpm., *plus*.

SELAS GRADIATION offers American industry *"production-engineered processing"* . . . key to improved methods and product quality . . . assurance of new highs in output.

GRADIATION—the newest concept of high-speed heat processing—*proved* during World War II, *improved* since . . . utilizes radiant heat as a precision tool for increased production. Combines high-temperature, automatic operation, precise controllability and protective atmosphere. Where *production* depends on heat processing, let Selas engineers prove *Gradiation* saves manpower, time, material and money.

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You're over the HIGH HURDLES Before You Start

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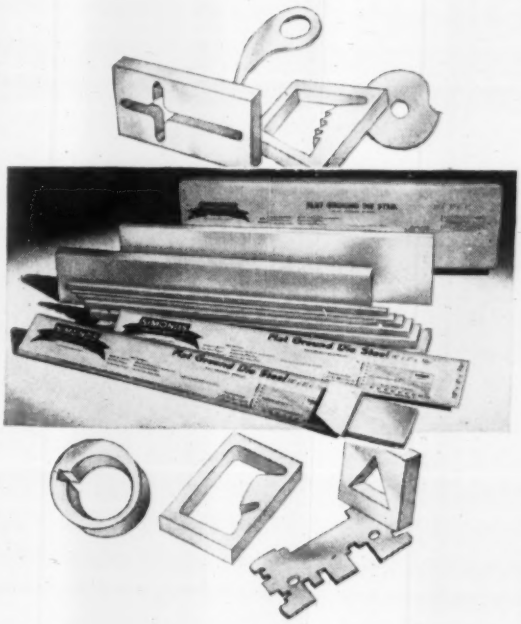
SIMONDS

Flat Ground Die Steel

to make dies, punches, parts, etc.



Blue it . . . mark it . . . saw it . . . that's all you have to do with "Red Streak" Die Steel. And look at all the things *you don't have to do:* You don't have to buy oversize bars and then waste metal grinding them down. You don't have to square the ends . . . for these are accurately finished and precisely square. You don't have to machine the flat sides, either. And you don't have to worry about heat-treating . . . for "Red Streak" Die Steel is *spherodized*-annealed to eliminate hard spots . . . to give a uniformly soft structure for easy machining and uniform harden-ability.

Yes, your toolmaking or parts-making job is about half done before you start . . . when you start with Simonds Flat Ground Die Steel. Order from your distributor today . . . he has it in all standard sizes.

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SOAKING PIT CRANE

with MULTI-PURPOSE tongs

Here's a rugged, lighter weight Soaking Pit Crane that handles any width slab or ingot. It'll make bottom . . . afford the same visibility as the high rack type Soaking Pit Crane, yet takes up no more head room than a low type Soaking Pit Crane.

Special features include: telescopic ram, all operating mechanism located on deck of trolley, operator's cage on deck of trolley provides best visibility and greatest distance from all sources of heat.

Multi-Purpose Tongs provide gripping range of 6" minimum to 66" maximum opening. Consequently, a much greater range of ingot and slab sizes can be readily handled.

The Multiple Range Tongs can be installed on any model or make of Soaking Pit Crane by Alliance Engineers who will be happy to discuss your specific requirements or give you general information of interest to your industry.

- MAXIMUM RANGE CAPABILITIES
- CRANE REQUIRES MINIMUM SPACE
- AFFORDS MAXIMUM VISIBILITY
- ALL MECHANISM EASILY ACCESSIBLE
- KEEPS OPERATOR AWAY FROM HEAT

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Helpful Literature

75. Spray Gun

DeVilbiss Co. — Illustrated data sheets on type TGA spray gun gives its specifications and features and lists models and accessories available. Gun can be used for touch-up, blending, stencilling, finishing small objects and general refinishing.

76. Diesel Engines

Worthington Pump & Machinery Corp.—18-page illustrated bulletin S-500-B52A describes four-cycle direct-injection totally-enclosed model DR diesel engines. Also featured are supercharged, dual fuel and supercharged dual fuel engines for industrial and motive power purposes.

77. Fork Lift Truck

Mobilift Corp.—2-page illustrated file-size bulletin gives specifications on Tier-Master fork lift truck which has 2000-lb capacity lift and is designed to move materials through low clearance doors and out of truck van bodies. Truck has 117-in. floor-to-fork lifting capacity, 47-in. free lift and 72-in. overall height.
ered.

78. Quick Change Chucks

Scully-Jones & Co.—4-page illustrated bulletin 3-50 and 1-page price list offer full information on Quick Change chucks and collets which simplify production drilling, tapping, reaming and similar operations. They have ASA or Morse taper and, though designed for vertical operation, can be used on screw machines and turret lathes.

79. Paint Sticks

Markal Co.—Illustrated folder lists types of Paintstiks for marking surfaces from minus 50° F to as high as 1800° F. Paint marks will not run, char, discolor, peel or crack and also defy weather and time. Chart aids in choosing right stick for particular job.

80. Punches & Dies

Niles-Bement-Pond Co., Pratt & Whitney Div. — 16-page illustrated pocket-size circular No. 553 furnishes information on various types of punches, dies and miscellaneous tools including Renshaw ratchet drill, standard steel taper pins, steel sleeves, standard punch couplings and center keys.

81. Handling Equipment

Towmotor Corp.—4-page illustrated "Standard Specifications" folder has data on capacities, load centers, lift heights, weights, dimensions, turning radii, speeds, and accessories for Towmotor fork lift trucks, tractors and electric pallet trucks.

82. Bellows Pump

Research Appliance Co.—12-page illustrated booklet explains construction, operation and applications of Corson-Cerveny Micro-Bellows pump. Pump is manufactured in two sizes: ½-in. bellows for pump rates of 15 to 1000 ml per hour; and ¾-in. bellows for pump rates of 30 to 2000 ml per hour. It is ordinarily supplied with 110-v 60-cycle 30-rpm motor and is intended for use at from 15 to 30-psig pressure.

83. Steel Service

David Smith Steel Co.—180-page illustrated 1951 catalog is divided into 12 step-indexed sections which list various types of steel products available and company's service facilities.

84. Expansion Joints

Yarnall-Waring Co.—16-page illustrated bulletin EJ-1912 covers Yarway Gunpakt and Glan-pakt expansion joints that can be serviced under full steam pressure without need for shutting down. Joints can be obtained in from 2 to 24-in. sizes for 150 to 300-psi pressure at up to 700° F operating temperature.

85. Tumbling Equipment

Tumb-L-Matic, Inc. — Illustrated bulletin No. LS-50 depicts and describes type LS single tumbler equipment for cutting down, deburring, definning, dry burnishing and polishing metal and plastic parts.

86. Ferrous Metal Cleaning

Pennsylvania Salt Mfg. Co.—8-page illustrated booklet "Heavy Duty Alkaline Cleaning of Ferrous Metals" describes approved methods for alkaline soak tank, spray, electrolytic and barrel cleaning as well as steam gun and manual cleaning of walls and floors. Procedures to be followed are fully described.

87. Industrial Brushes

Osborn Mfg. Co.—76-page, illustrated Catalog No. 210 covers factors involved in selecting right brush for specific jobs such as operating equipment requirements, brush characteristics, operating conditions and surface speeds. Complete data are given on power brushes for cleaning, polishing, deburring and other work. Also detailed are paint and varnish brushes as well as factory or plant maintenance brushes.

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HELPFUL LITERATURE

88. Industrial Conveyors

Jervis B. Webb Co.—90-page illustrated floor type conveyor catalog No. 51 deals with conveyor chains, chain-on-flat and chain-on-edge floor conveyors with variety of dogs for pushers. Typical drive and take up ends, sprocket and roller curves, inclines and declines and other accessories are described. Details of slat-apron, scraper, roller flight and other conveyors are listed.

89. Resistance Welder

Progressive Welder Sales Co.—4-page illustrated bulletin 5101 presents three-phase press type and rocker arm spot welders which are available in sizes from 50 kva up. Machines are certified for AN-W-30 and AN-W-32 welds.

90. Polishing Accessories

Manderscheid Co.—6-page illustrated bulletin 108 describes Presto backstand idler for any length abrasive belt from 84 to 168 in. work holding spinners, precision balance ways, semiautomatic tube polishing machine, emery troughs, wheel rakes and support stands. Also included are Presto tapered screw points, chucks, lathe flanges, polishing wheel bushings and other equipment.

91. End-Finishing Machines

Pines Engineering Co.—4-page illustrated bulletin shows bench type and rod end-finishing machines and explains how interchangeable features speed deburring work, inside and outside chamfering, facing, center drilling, reaming, boring, light forming and turning operations within 2-in. capacity range.

92. Production Control System

Remington Rand Inc., Management Controls Div.—40-page illustrated guide No. TM-596 is entitled "Production Control in Manufacturing Industries." Shown are punched card methods for control of every phase of production including engineering records and procedures, production and forecastings, materials controls scheduling and progress reports. Answers to inventory control problems are given.

93. Adjustable Loading Docks

Rowe Methods, Inc.—4-page illustrated folder shows typical installations of Ajust-A-Docks, along with discussion of advantages of adjustable loading docks—savings in dock space, handling time, labor and breakage. Design and construction features and present models are depicted.

94. Portable Lamps

Daniel Woodhead Co.—32-page illustrated catalog "Protex-Vaprotex Rubber Handle Portable Lamps" describes types of portable lamps available in various sizes, with and without reflector, for all types of applications. Bunghole, low voltage, waterproof, vaporproof and oil resistant types are included, along with data on parts, connectors, plugs and related equipment.

95. Gear Production Methods

Michigan Tool Co.—Technical bulletins 101-110 deal with gear production methods and tell how gear production has been increased, cost reduced or quality improved in different plants.

96. Fork Lift Trucks

Silent Hoist & Crane Co.—6-page illustrated bulletin No. 77 describes line of improved heavy duty fork Liftruks. Uses, specifications peculiar to three models and entire line and available extra equipment are covered.

97. Coated Abrasives

Michigan Abrasive Co.—Two 6-page illustrated folders "Let Us Introduce Red Coat Brand Abrasives" and "Discount Schedule for Industrial Customers" describe various types of belt, roll, disk and sheet coated abrasives and list quantity discounts for aluminum oxide, garnet, silicon carbide, emery and flint paper, cloth and combination abrasives.

98. Centers

Ready Tool Co.—Prices, dimensions and other information are given in illustrated bulletin on Red-E cemented carbide tipped and high speed centers. Specifications are listed for Morse, B & S, Jarno, Hendey, ASA and Norton tapers.

99. Servo Amplifier System

Minneapolis-Honeywell Regulator Co., Brown Instruments Div.—4-page illustrated pamphlet I.D.S.10.20-3 covers technical details on operation and application of servo amplifier system adaptable to detection and correction of error signals and operation of null-balance systems. It consists of converter, amplifier and two-phase fractional horsepower motor.

100. Metal Spinning

Spincraft Inc.—40-page illustrated data book No. 3 "Metal Spinning and Fabricating" presents information on mechanics of spinning, basic shapes and scope, design, machinery used and range of metals suitable for spinning. Various items made by process are pictured and described.

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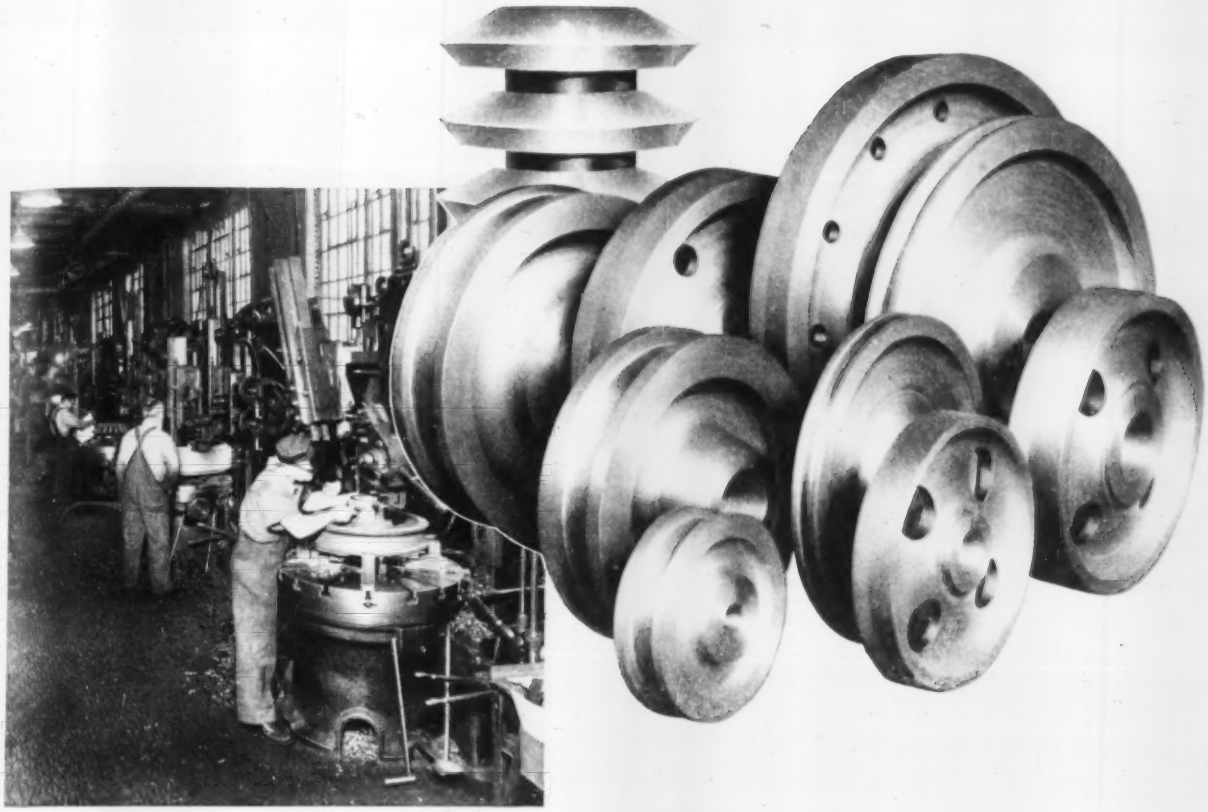

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Almost every machinery builder is constantly seeking ways to improve his product and keep his costs in line. Bethlehem circular steel forgings can help do both.

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Bethlehem makes these circular forgings in sizes from approximately 10 in. to 42 in. OD. They are furnished heat-treated or untreated, whichever the user prefers. For more details, request a free copy of Booklet 216.

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Take a look at your company's Payroll Savings Plan. See that every employee—particularly the newer ones—are given a Payroll Savings Application Blank—and an opportunity to save through monthly investment in U. S. Defense Bonds. Phone, or write to *Defense Bonds Division*, U. S. Treasury Department, Suite 700, Washington Building, Washington, D. C. Your State Director is ready to help you help your employees and your country.

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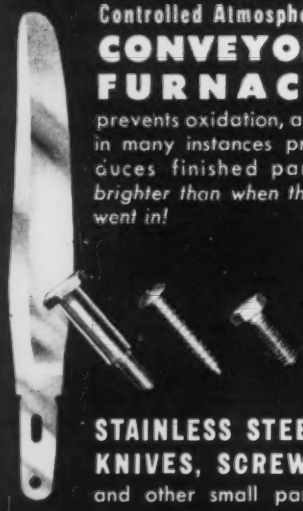

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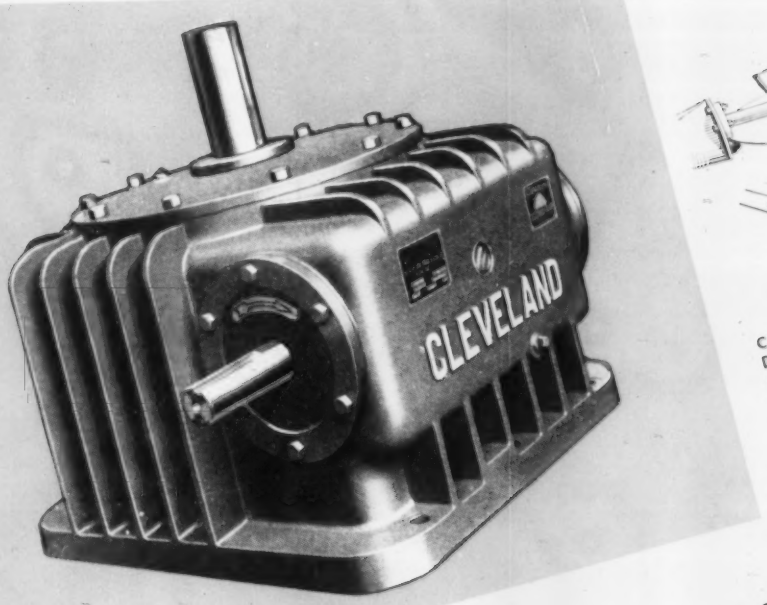

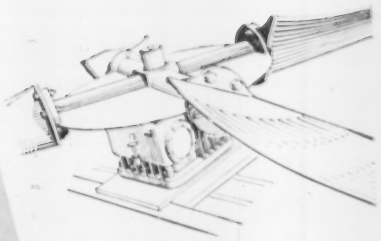

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Write for Bulletin 155 for full description of Type CU. Ask also for free literature on other Cleveland units. The Cleveland Worm & Gear Co., 5270 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

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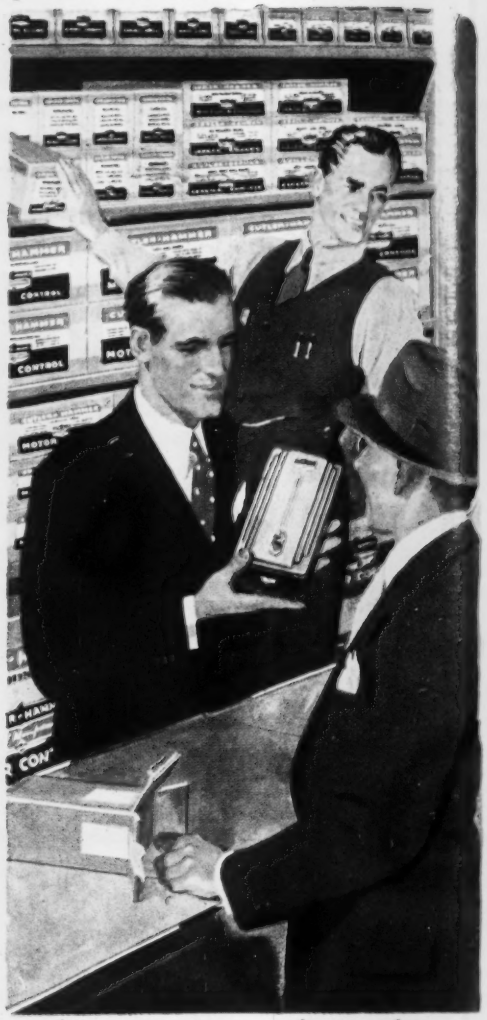

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